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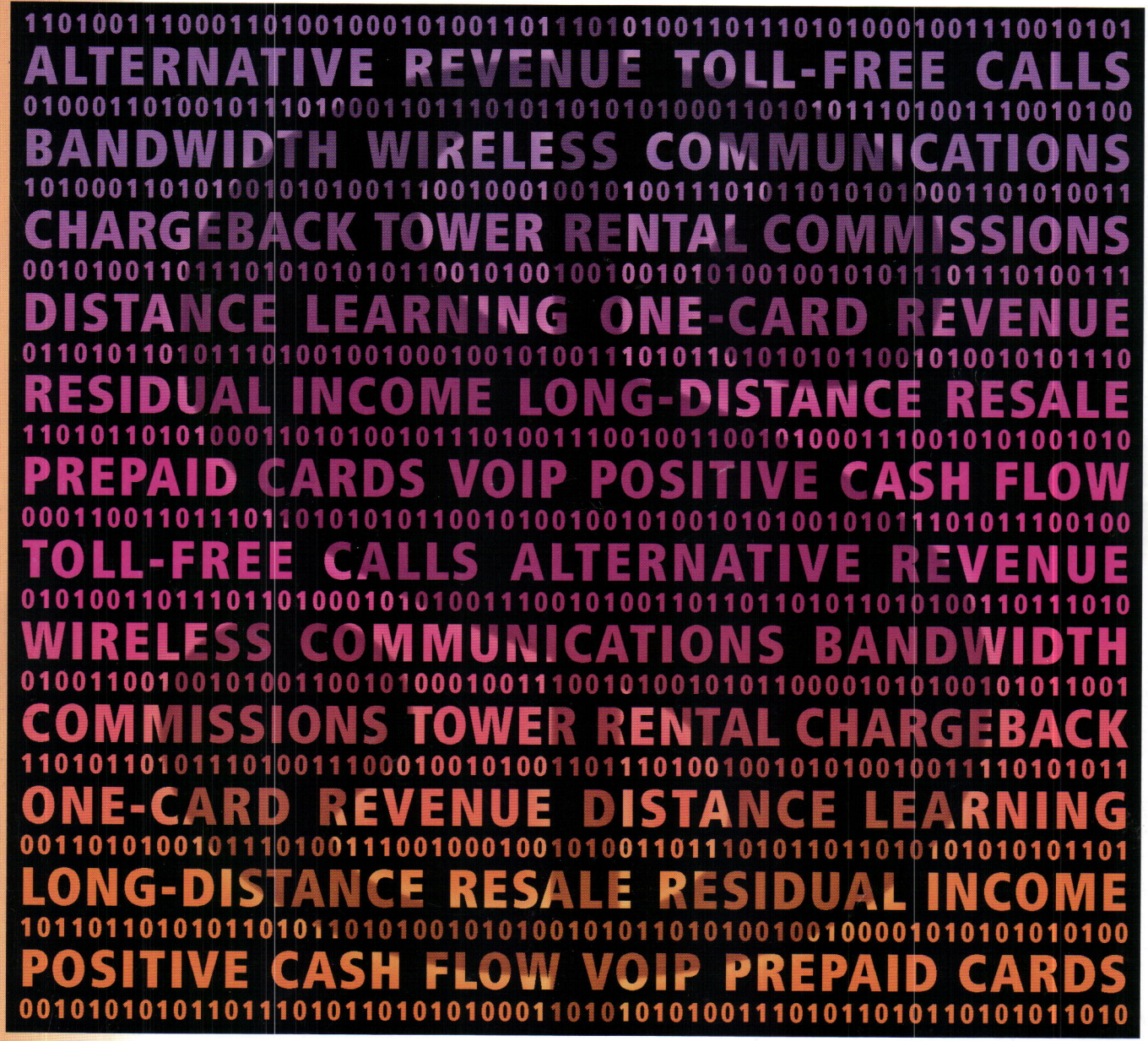
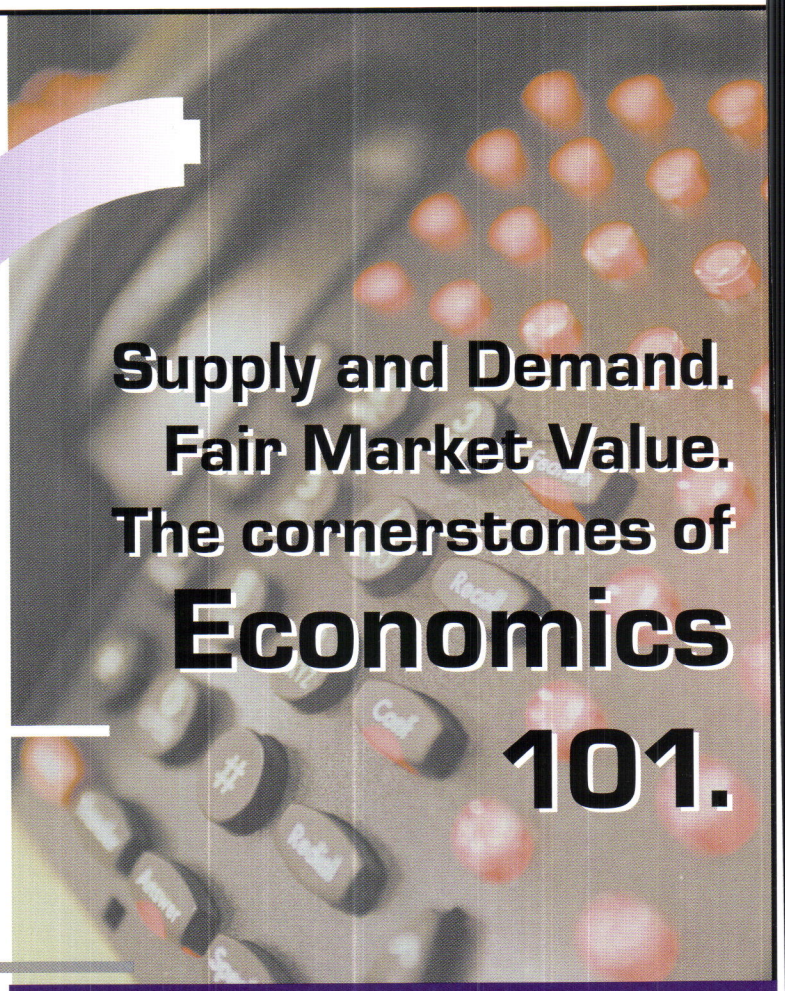


This Issue: Planning for New Technologies and Alternative Revenue Sources

Economics and Your Phone System



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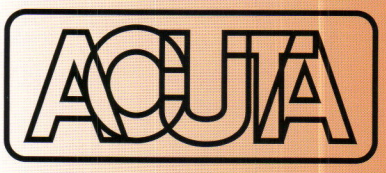

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—Jake B. Schrum, PhD
President, Southwestern University
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The ACUTA Journal

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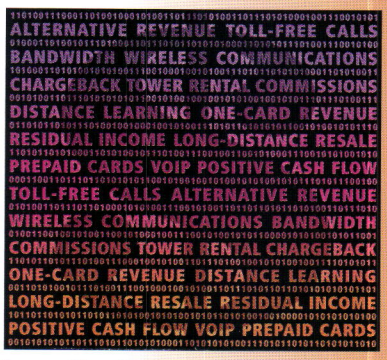


Focus: Planning for New Technologies and Alternative Revenue Sources

COLUMNS

INTERVIEW

BOOK REVIEW

Maureen Trimm
Stanford University
ACUTA President
2001–2002

President's Message

Managing to the Bottom Line

With apologies to George Carlin, the seven words university or college managers can't say (or even admit to doing) are marketing, profit, sales, competition, bundle deals, commissions, and advertising. Instead, we use euphemisms, for there seems to be something in the cultures of many higher education institutions that scoffs at a marketplace management mentality.

While faculty may be particularly aligned with the sentiment that an internal department should not be "marketing" services, the reality is that most ACUTA members must promote new technologies, leverage existing investments, struggle for new investment dollars, analyze business plans for ROI, support growing demands for bandwidth, and ferret out opportunities for new business. And the most pernicious reality is that of administrative demands to make a profit—whoops, I should say, "produce revenues"—to support other lines of business.

The challenge faced daily in "ACUTA-land" is to make it faster and smarter while, of course, making sure that new investments are fully cost recoverable within an ever-decreasing technology life span. Revenues from services that traditionally provided support for new initiatives (e.g., long distance) are drying up and are no longer available to cross-subsidize technology trials or network installations. So is it time to panic?

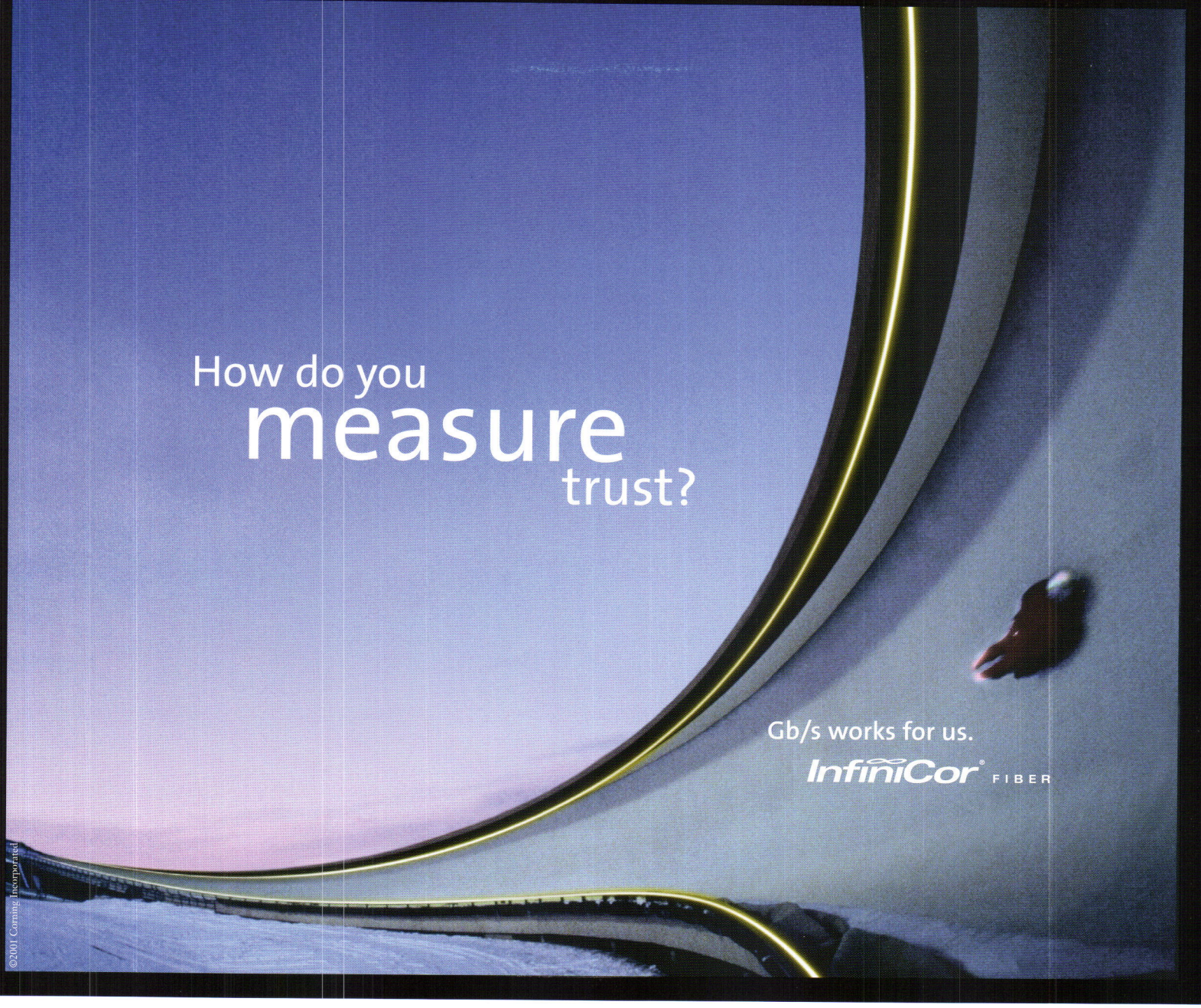
No. There are still options in this telecom consumer age. While the fruit is no longer hanging from the lower branches, there is still some for those willing to step up the ladder. Alliance partnerships are possible with hardware, software, and service vendors, but we must give serious thought to what we might have to give up to make such partnerships profitable for all participants. Will it be worth it, and who determines what "worth" means?

New client groups may be worth investigating, but what are the legal ramifications of expanding service—and thus revenue—beyond the campus or the traditional client base?

We might consider ending dated services, but how do we recognize and convince entrenched clients that a service is no longer reasonable to support?

We all have a bottom line, and for universities and colleges, managing to that bottom line has become more important than ever. In this issue of the *ACUTA Journal* and in this year's ACUTA seminars and annual conference we'll address this challenge. Deals, partnerships, benchmarking, and outright idea stealing will occur. This is what we must do to survive, let alone prosper, while providing world-class service in support of teaching, learning, and research.

According to our friend George Carlin: "There are two pips in a beaut, four beauts in a lulu, eight lulus in a doozy, and sixteen doozies in a humdinger. No one knows how many humdingers there are in a lollapalooza." I'm confident you'll find at least a pip of an idea as you read on in this *Journal*.



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Discovering Hidden Revenue Sources in Ancillary Telecom Services

by Wendy Pryne
President, SpectraCorp Telemanagement Group, Inc.

As college students migrate toward cell phone and prepaid-card usage, university telecommunications managers are drawn to an inevitable conclusion: The tremendous shift in student calling patterns continues to deplete resale revenue streams. Telecom managers on campuses everywhere must undertake a seemingly endless search for unique ways to repackage and remarket student-pricing and calling bundles and seek out new sources for incremental income. The revenue attrition locomotive has steadily gathered steam during the past two years. How do we put these derailed revenue trains back on track?

A handful of universities, such as Binghamton University in New York, have taken an aggressive, entrepreneurial approach by marketing outside the traditional boundaries. Binghamton currently markets to off-campus students a bundled package that includes local, long-distance, and Internet services. To do this successfully, a school must have both the staff and the political means to creatively leverage a respectable profit. It is possible for colleges and universities to locate additional profits without tying up their internal resources. A respectable telecommunications profit can be found without a full-scale sales and marketing effort.

Toll-Free Calling Patterns at San Diego State

Working with Riny Ledgerwood and Lynne Zang at San Diego State University (SDSU), SpectraCorp conducted a study to quantify the changes in student patterns for using prepaid, calling card, and collect services dialed via a toll-free number. We analyzed the types of toll-free calls leaving the university PBX to determine the top 25 toll-free numbers dialed during May 2001 and compared

them with the top numbers in May 2000. The SDSU residential student population is 3,850 students.

In May of 2000, calling-card and collect platforms led the top 25 with 54 percent of the total toll-free calling. Prepaid cards were prominent, but calling-card platforms dominated. 1-800-CALL-ATT topped the list with 2,938 calls. However, by May 2001, one year later, 1-800-CALL-ATT had dropped to the number 10 spot with only 921 calls. Prepaid calling-card platforms now dominate the top 25 list.

The top two most frequently dialed toll-free numbers belonged to the Costco (Sprint) and the Sam's Club (AT&T) prepaid-call platforms. The price point for both cards is $.0416 per minute with no "hidden" surcharges. Certainly for that price, the student accepts the inconvenience of dialing a toll-free number for every call as a cost-effective trade. In addition, the easy access to local Costco and Sam's Club stores, both located within four miles of the University, helped to boost the traffic volume. The SDSU PBX tracked over 26,000 toll-free calls to these two prepaid platforms, which equaled 18 percent of the total toll-free revenue for calls dialed in May 2001.

The "wholesale club" prepaid-service calling phenomenon has been identified in schools across the country. Miami University in Oxford, Ohio, experienced similar trends. They found that the Sam's Club prepaid card accounted for 17,950 calls in one month.

Nationwide, the growing popularity of prepaid cards has resulted in a nearly 100 percent increase in the toll-free minutes processed through university PBXs. Overall, the San Diego State PBX processed more than 485,000 outbound toll-free minutes or 101,000 calls during May 2001, representing a 46 percent increase in the total toll-free call volume. The average number of toll-free calls per student per month rose from an average of 65 calls in 2000, to 130 calls in 2001.

Revenue Opportunities in Prepaid Telecom Services

Many schools are taking advantage of alternatives that do not require the school to market services on their own. With these programs, the vendor maintains the service and returns a residual income to the school.

AT&T College and University Solutions (ACUS) has an online prepaid service designed to serve the collegiate marketplace. Based on the involvement of the school, it is their responsibility to provide an on-campus and an extended off-campus student database, advertising space on their Web site, and the bundling of other services. The school is able to keep a residual from the ongoing sales of the prepaid program. This plan allows the school to receive a residual income from the ongoing sale of the prepaid time purchased via the ACUS Web site. There are two different pricing schemes available offering a $.039-per-minute option with a surcharge or a flat-rated card that is priced as low as $.099 per minute.

Price and easy access to prepaid phone time will attract on-campus and off-campus students with established prepaid buying patterns. Students make purchases based on ease of accessibility to services, not just on the total price,

preferring to order prepaid phone time online rather than drive down the street and stand in a long line. This "virtual" prepaid service also acts as an excellent long-distance service option during summer school and camps.

We observed in the SDSU study that the fifth-ranked toll-free calling card was the Sprint Prepaid Card, sold at the University bookstore, which generated 1,872 calls. The cost per minute of the card averaged from $.15 to $.165. In this case, the ease of purchasing the card outweighed the fact that it was not an outstanding buy.

Yet another prepaid revenue program is prepaid vending machines. Jay Bertucci at Loyola University in New Orleans (on-campus student population of 1,500) wanted to place a prepaid machine in the student union but struggled with the potential conflict of competing with the university bookstore. Willing to experiment, Jay decided to install a machine in a residence hall. That one machine processed $800–$1,500 per month in card revenue for which the school received a monthly residual.

Outbound Toll-Free Dialing

Many schools, including SDSU and Miami University, have taken advantage of toll-free origination service to generate substantial residual income. Per-minute commissions from outbound toll-free calls are offered by CLECs through T-1 access. The bottom-line advantages of the program are twofold: a revenue stream and a no-cost option to add telephone trunks because the toll-free T-1 removes call traffic from the existing local CO trunks. Toll-free origination is not a big money maker for the CLEC, but serves as an entrance into the school, enabling them to capitalize on local, long-distance, and Internet service sales opportunities. If your school has yet to implement this program, time is running out. Several CLECs no longer offer the service or have reduced the compensations by as much as 50 percent.

Depending on the total monthly toll-free minutes and geographic location, the monthly commission may cover the cost of the T-1 loop. At a minimum, this program provides a "free" or relatively cost-free solution to adding trunks. For those schools contemplating disconnecting their TSAA services and redirecting traffic to other trunks, toll-free origination may be a creative answer to moving around the minutes while creating virtual trunk capacity.

> Telecom managers on campuses everywhere must undertake a seemingly endless search for unique ways to repackage and remarket student-pricing and calling bundles and seek out new sources for incremental income.

What's Left in Operator Services?

Operator services includes a variety of calls (dialed via a 0) that are either billed through a calling card or credit card or require the assistance of an operator, such as collect, third-party, and person-to-person calls.

Operator service calls are very expensive today, with the default cost of an interstate calling-card call placed via a 0 billing at $.89 per minute with a $4.99 surcharge on most carriers. Within the past year and a half, AT&T has raised operator service rates twice, and the other major carriers have followed. Intrastate costs do vary among carriers because of the effort it takes to file intrastate tariffs. For example, the MCI surcharge for a calling card in the state of Wisconsin is still $.80 versus AT&T at $4.99.

Toll-free calling cards and collect platforms such as 1-800-CALL-ATT or 1-800-COLLECT carry a variety of per-minute rates and surcharges that are also high in cost. These operator service platforms accessed via toll-free numbers do not offer any commissionable revenue to the schools; they continue to detract from the dwindling 0+ revenues. Fortunately, discounted operator programs are now available that allow a caller to access operators via a toll-free number and pay the school a commission for the calls. The student also benefits by saving from 8 to 60 percent. The savings vary based on whether the call is an intra- or inter-state call and the type of call placed.

Traditional operator service revenue generated from schools is no longer consistent across the country. Much of the zero-plus usage in universities is dependent on how aggressive the school is in marketing a competitive resale program. According to data supplied by clients, for the year 2000 schools averaged $2.50 to

$3.00 per student per month for gross billed revenues, provided that the student placed the call through the university's default operator. However, AT&T and the other major carriers raised the rates in late May of 2000, and schools' revenue declined substantially.

Across the board, operator service call volume nearly dropped in half. Now the average school generates only $1 to 1.50 in gross revenue per student per month. Hospitals still maintain healthy operator service revenues with call volumes in the $5.00 to $9.00 range per patient bed per month.

The operator service trend follows the trend of decreasing student resale usage. Most schools have received operator service commissions for years. Listed below are several suggestions to maximize those commissions.

- Make sure your operator service provider has all your trunk numbers. Even if operator calls will not be placed on these trunks, the trunk information is helpful for screening fraud.
- Be careful when making routing and PIC changes. Operator access can inadvertently be blocked or operator calls can be redirected to another carrier leaving the school without screening or commissions.
- Make certain the student has to dial a PIN code for 800 calls in the resident halls. Forcing the student to dial a PIN code for all calls (especially 800) encourages the student to use the school's resale program while maintaining a commissionable operator services volume.
- Be cautious when routing operator traffic offered from major IXCs over CLEC trunks. Many CLECs do not have arrangements to pass the billing information to the carrier.
- Verify that calls within the LATA are simultaneously generating income dollars. ILECs pay operator commissions, and the rates to the students are significantly less than routing the calls to a major IXC.
- Don't forget the administrative staff. Routing all operator calls generated from the PBX will boost the overall commission call volume.

All operator carriers are not identical! Operator services is a consumer-driven product, and the student is more likely to place the call through a recognizable carrier such as AT&T, MCI, or Bell South.

Operator services revenue is now only a shadow of its former self, but minimal time and effort

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spent to review these areas can result in unrealized revenue, which should improve the bottom line.

Directory Assistance—Don't Overlook the Chance to Save and Control Costs

Directory assistance costs are like a moving target. National directory assistance rates have slowly crept up to alarming price levels to compensate for the reduction in long-distance rates. The big three carriers typically charge $.95 to $1.99 per query. Additionally, intraLATA "411" rates have also increased. For example, the intraLATA retail rate for many of the Bell South states is now $.85 per query.

The billing issues related to this service prevent schools from effectively controlling costs. Because of the varied rate structure involved in directory assistance, it is next to impossible for the school to identify per-student, per-usage cost. Also, many schools complain that directory assistance providers automatically complete the call for the student resulting in a higher cost.

Since directory assistance calls typically are not a contracted item, the school has the flexibility to redirect these calls. Discounted directory assistance options are available through some IXC offerings or CLEC services. Some of the ILECs, such as Bell South, now offer an attractively priced wholesale directory assistance program with nationwide access. Costs can be reduced per query by 25–60 percent, and many of the providers will block automatic call completion.

A review of directory assistance costs may not be worth the time invested at first glance. But the annualized savings from these high-priced calls can be substantial.

Conclusion

While none of these suggestions is a magic bullet, pennies do add up to dollars. Very little effort is required to act on some of these suggestions. To recognize and respond to the buying trends of today's typical student, you must think beyond the boundaries of student resale.

Wendy Pryne is president of SpectraCorp Telemanagement Group, Inc., headquartered in Dallas, Texas. SpectraCorp has more than 10 years' experience in returning millions each year in income by identifying and maximizing telecom revenue programs.

How Videoconferencing Helps Universities Serve New Markets

by Curt Harler
Contributing Editor

Universities must constantly look for new markets they can serve and for new ways to serve old markets. The drivers for this search are many: meeting financial needs, reaching new student groups, and supporting staff projects, to name a few. Many institutions, including the University of South Florida at Tampa (USF Tampa) and the University of Maryland, are using distance learning and videoconferencing to meet those needs.

University of South Florida

Educational Outreach at USF Tampa supports the largest distance-education program in the state of Florida with 12,270 enrollments last year. According to Lynn Rejniak, director of research and development for Educational Outreach at USF Tampa, they constantly are finding new ways to expand and upgrade their system, including a move to IP (Internet protocol). USF has an 18-year history in electronic education with 300 courses offered, supporting over 2,000 hours of videoconferencing last year.

"Interactive video provided another delivery option for faculty interested in teaching at a distance," Rejniak says. "The applications are endless."

Andy Bryan, network coordinator at USF, has a group of workers—mostly students—who do the normal conference setups. "It's easy...like setting up a computer," he says.

"This early technology did not support faculty interested in interactive group-based learning models, and therefore they did not participate in course offerings at a distance," Rejniak explains. "By implementing videoconferencing technology, more faculty were willing to participate in distance learning and, as a result, distance-learning course offerings increased."

USF began using videoconferencing in 1995. They used the State Information Technologies Division's bridging services for any multipoint activity. In 1996, a four-port ISDN bridge was purchased as part of a grant. This grant supported the delivery of special education to teachers in rural areas. By 1998, USF purchased a 14-port, H.320 bridge, which supported interactive video

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between USF's four campuses and a collaborative distance-education project involving area community colleges.

The Tampa campus has an ATM backbone that reaches to the three regional campuses and to the downtown location over a dedicated T-1 backbone. They use dial-up for the community colleges, Rejniak says.

Early on, most of the conferences were simple asynchronous video setups. Typically, in the science area, a professor wanted to deliver a one-way lecture to students.

"Being an urban campus, we do not emphasize the distance aspect as much as the time and convenience features," Rejniak says.

However, professors in the social studies and other areas wanted more features and flexibility in their conferencing.

Another driver in the upgrade was a decision by the USF College of Nursing to deliver its entire masters program using videoconferencing. In the first year, USF dedicated nine classrooms for videoconferencing, and by the beginning of the second year, five more classrooms were added. When the process called for upgrading from the original bridge, the school selected the Accord MGC-100 from Polycom Network Systems (www.accordnetworks.com, Milpitas, California).

Last year, Educational Outreach received a $3 million congressional award from the Department of Education to support a project focusing on innovative teaching/learning models using technology. This project helped to expedite upgrading the videoconference bridge to include IP technology.

Remote control of network operations could take place anywhere, anytime, which is important with limited staff and expanded support hours. Most users are impressed with how easy it is to use the management system, and training part-time staff to schedule conferences and troubleshoot was simplified with the Accord product.

Department Successes

This past spring, the USF Department of Biology had Eugenie Clark, a world-renown marine biologist, teach an entire course via videoconference from the MOTE Marine Lab located in Sarasota. Students from three of the four USF campuses participated in the MOTE class.

Special education uses videoconference in support of a grant-based project—Direct Instruction for Advanced Learners (DIALS)—which focuses on providing continuing education to special education teachers in rural communities.

Social work is team teaching a course with a faculty member from Savannah State University. Both faculty members share instruction and classrooms, as students are enrolled at both institutions.

Another faculty member in the Department of Biology uses videoconferencing (over IP) to support his research activity for a federal government project, Small Business Innovations Research. His work on this U.S. Navy project studies the effect of shark attacks on submarine cables. He conferences with colleagues at the University of Hawaii, his collaborators on this project.

The Department of Secondary Education taught a course collaboratively for two semesters with Virginia Polytechnic Institute (VPI) using videoconferencing over IP in a point-to-point configuration. Another course in distance learning demonstrates and discusses videoconferencing online. The videoconference demonstration was provided in real time to students enrolled in the on-campus section of the course, then digitized and stored online, making it available to students enrolled in the online course. (To see this demonstration, visit www.netcast.usf.edu and select the Education heading in the left-hand column. Under the Education heading, select Videoconference with Syracuse University.)

The Flexibility Factor

As early as 1999, Educational Outreach made the decision to begin migration of the distance-learning networks to IP/browser-based platforms. These platforms afforded flexibility—distance-education applications would no longer be restricted to a specific delivery system—and traditional site-based applications could be extended to distributed environments.

Rejniak's team supports both regularly scheduled lectures and extemporaneous meetings. Availability of advance scheduling options was key for routine classes. Without this unique option, each week all classes had to be entered manually. While they like 24 hours' notice, Bryan says they can usually set up a conference in a matter of minutes.

Typically they run a test connection with the other institution prior to setting up the conference. "We've done it in as little as 15 minutes," he

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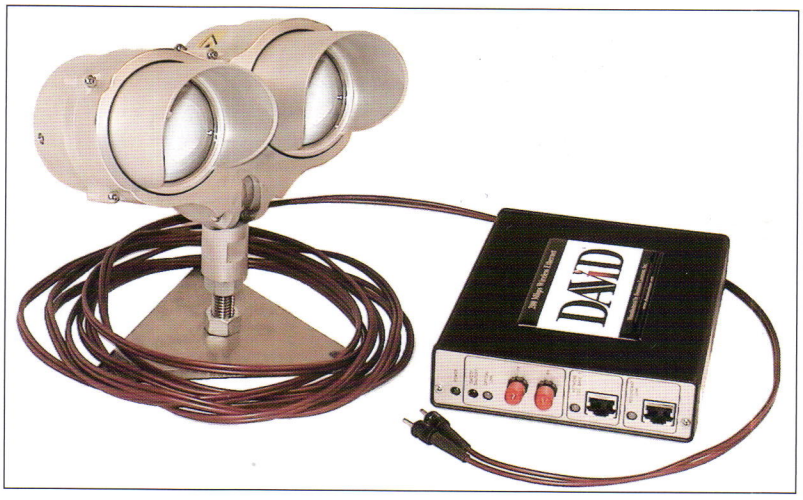

says with the air of one who has survived a tidal wave.

"On the great road of convergence, we see IP as the best standard," Rejniak says. "It allows us portability and flexibility."

"We can simply pull out a native ATM or ISDN card and pop in an IP card," Bryan says, a feature of the bridge that simplifies his life. Since USF is an Internet2 school, the ability to move systems rapidly to IP will only become increasingly important.

Bryan also likes the system's ability to change formats on the fly. Lecturers can choose to switch between continuous presence, lecture, voice-activated, or multilocation formats at any time during a conference. Under the old setup, continuous presence could not be done on the fly or from the classroom. This was frustrating for faculty who wanted the flexibility while teaching to switch from full screen when displaying documents to continuous presence for discussion and other interactive activities. It was particularly cumbersome for courses offered once a week for three hours.

"A faculty member had to plan the entire course around the decision to remain in continuous presence or full screen," Rejniak notes. The Polycom/Accord product provides this flexibility with its management suite of solutions.

Rejniak appreciates the ability to support both H.320 and H.323 as the migration takes place. "As the University is readily able to support IP-based videoconferencing, many of the locations participating in these activities are still dependent on ISDN technology," Rejniak notes. Since it was only two years ago that much of the equipment was purchased, being able to continue to use existing product based on H.320 until new resources are identified to buy new product is important to USF.

Flexibility to set up short-term use of videoconferencing—short courses, onetime offerings, and guest lectures—was important. However, Rejniak adds, to install T-1 or ISDN lines for these types of applications was costly.

From dorm rooms in Garrett Hall, the student CEOs now have access to key e-business communications tools like desktop videoconferencing, multimedia messaging, high-speed data connections, voice over the Internet, and wireless roaming technology.

"Often we were unable to respond in a timely manner due to installation requirements," she says. IP afforded the opportunity to "plug and play." Polycom IP portable videoconference units can be transported easily to any classroom with an Ethernet connection, so these types of requirements are readily supported.

Let's Share

In addition to Educational Outreach's decision to transition its networks to IP technology, other University technology divisions were moving in a shared direction.

- USF Information Technologies and Academic Computing divisions are completing a 100-megabit campuswide project.
- Educational Outreach collaborates with Academic Computing for the delivery of Web-based courses.
- The Health Sciences Center integrated an IP-based videoconferencing bridge for continuing medical education needs. The University became an I2 member, which opened up an opportunity for broadband videoconference exchanges between other member institutions for both research and classroom based activity.
- The University TV station—WUSF-TV, a PBS affiliate—built a new facility and upgraded control and production operations to digital. They plan to be broadcasting fully digital in the next year.

"Educational Outreach collaborates with WUSF for the delivery of telecourses, and we are in the process of piloting an iTV project," Rejniak says.

The USF conferencing setup supports intercampus lectures and lets corporate students working remotely from campus continue their education. It also enables university-to-university conferences and gives USF the ability to bring in guest lecturers or to collaborate with international universities. Specifically, USF's Department of Social Work and the College of Nursing collaborated on an interdisciplinary course offering with Vandesberg University in Sweden. This course involved four videoconference sessions between institutions.

Given the dwindling nature of budgets, USF may eventually look at billing for bandwidth used for nonacademic purposes. USF is one of many Research One institutes that have taken significant cutbacks.

"We need new ways to gain revenue outside of state funding," Rejniak says. "As we support the broader community we need to see how billing features will play a role."

Maryland Entrepreneurs

Technology is also helping a year-old program at the University of Maryland transform a traditional pool of users into super users. Called the eDorm project, it is designed to give students participating in the University's Hinman Campus Entrepreneurship Opportunities (CEOs) Program easy access to the communications technologies they'll need to build their own businesses.

In its first year, Maryland's Hinman program had to reach out for participants. Now, says Karen Thornton, associate director of the Hinman CEOs Program, "the students are at our doorstep." Thornton is technical administrator for the eDorm initiative.

The Hinman CEOs Program is a living-learning program at the University of Maryland that is offered to undergraduate students who demonstrate an interest and potential strength in entrepreneurial ventures. The program is cosponsored by the Engineering Research Center of the A. James Clark School of Engineering and the Dingman Center for Entrepreneurship of the Robert H. Smith School of Business. The program provides a team-based, technology-driven, incubator-like environment in a technologically advanced residence hall. Several other schools have also developed incubators (see *"Show Me the Money—Entrepreneurs on Campus"* on page 18). More information about the Hinman CEOs Program is available on its Web site at www.hinmanceos.umd.edu.

Young entrepreneurs got their "high-tech boost" when the University launched its electronic dorm in December 2000. From dorm rooms in Garrett Hall, the student CEOs now have access to key e-business communications tools like desktop videoconferencing, multimedia messaging, high-speed data connections, voice over the Internet, and wireless roaming technology.

Thornton says the program got started when an engineering graduate, Brian Hinman, donated $2.5 million over 10 years to the University for the program. "He wanted to create an environment, an incubator for entrepreneurs," she explains. The grant covers everything from wireless laptops to the four videoconferencing rooms to residence hall scholarships for students who live at home and cannot afford to live on campus.

"They have access to wireless, printers, copiers, faxes, videoconferencing,...whatever they need in the way of business tools to give them a leg up on anything they want to research," Thornton says.

While the program is sponsored by the business and engineering schools, it is truly a cross-campus project. Technology for the program was designed and equipped by Avaya (www.avaya.com, Basking Ridge, New Jersey). ▶

"We are truly excited that Avaya has joined with us to support innovation in the teaching of entrepreneurship by networking our entrepreneur's dorm," says C.D. Mote, Jr., University of Maryland's president. "As a result, young entrepreneurs at Maryland now have access to the most advanced communications technology right in their dorm, better than what is available to the vast majority of workers in most U.S. businesses."

It will be difficult to find a better program to sell a college to students. After extensive meetings with the University Office of Information Technology (OIT), an existing space was upgraded for the first year. Cabling was upgraded from Cat 3 to Cat 5. T-1 service was arranged on the campus backbone.

There are two videoconferencing setups at the program's office, one more at the TAP (Technology Advancement Program) center, and a fourth in the engineering building. Access to the conferencing setups is round the clock, seven days a week. "The program pays the costs," Thornton says. The grant pays for the cost of any conferences.

Beyond the high-tech aspects are the softer, human aspects. A Wall Street law firm with local offices sends partners to the program several times a year to help with legal issues. The program administrators hope that alumni will come back and act as mentors.

The program attracts undergraduates with sophomore to senior standing, although most participants are upper class.

"For next year we will have just over 100 students come to us with their GPA (grade point averages) and an essay," Thornton says. Those students will likely be housed in a brand new building being erected for the program.

Student Jesse Chong and his team have been able to videoconference with industry veterans at Accenture Consulting in Reston, Virginia. Other Hinman CEOs ran a videoconference with Cacheflow, Inc., in Silicon Valley, California, to discuss strategy for developing their own information technology start-up. Ilya Zusin will use multimedia messaging technology to strategize with his partner at Brown University about potential venture capital.

The Enterprise-Class IP Solutions (ECLIPS) portfolio combines voice, data, and video onto a single network. Using Avaya technology, the students' laptops become multimedia communications devices that enable them to make and receive calls and hold conferences via their laptops from any place they can connect to the Internet. Combined with the wireless LAN, students can hold conference calls from anywhere.

Aspiring entrepreneur/student Ryan Ockuly says he believes the technology gives him an edge. "I will be able to start a business with advantages that others don't have. The technology brings credibility to my venture."

This past year, the eDorm housed 21 of the 60 Hinman CEOs. The University plans to increase capacity in the future. As part of its agreement with the University of Maryland, Avaya also equipped three conference rooms, an office, and a computer lab in Garrett Hall with its e-business solutions. The eDorm is the first initiative to be completed in a broader memorandum of understanding between the company and the University of Maryland announced a year ago. The agreement calls for the company to equip the eDorm, collaborate with the University on the development and testing of new e-business applications, and become an anchor tenant in the University's proposed new Technology Park.

In addition to the dorm and classroom projects, there is a Business Plan Competition in the program. This year there were 54 entrants. It is open to all students and alumni up to five years beyond graduation. This year's winners included a biotechnology PhD and students with a view to starting their own company with a low-cost solution for producing high-quality ultraviolet (UV) light sensors.

When the new building is completed, Thornton says students will be able to interact and brainstorm better. The program will not grow much larger than it is today, but there will be more team organization, she expects.

Both the University of South Florida and Maryland use an established technology to meet new needs and reach new markets —to the benefit of students and faculty alike.

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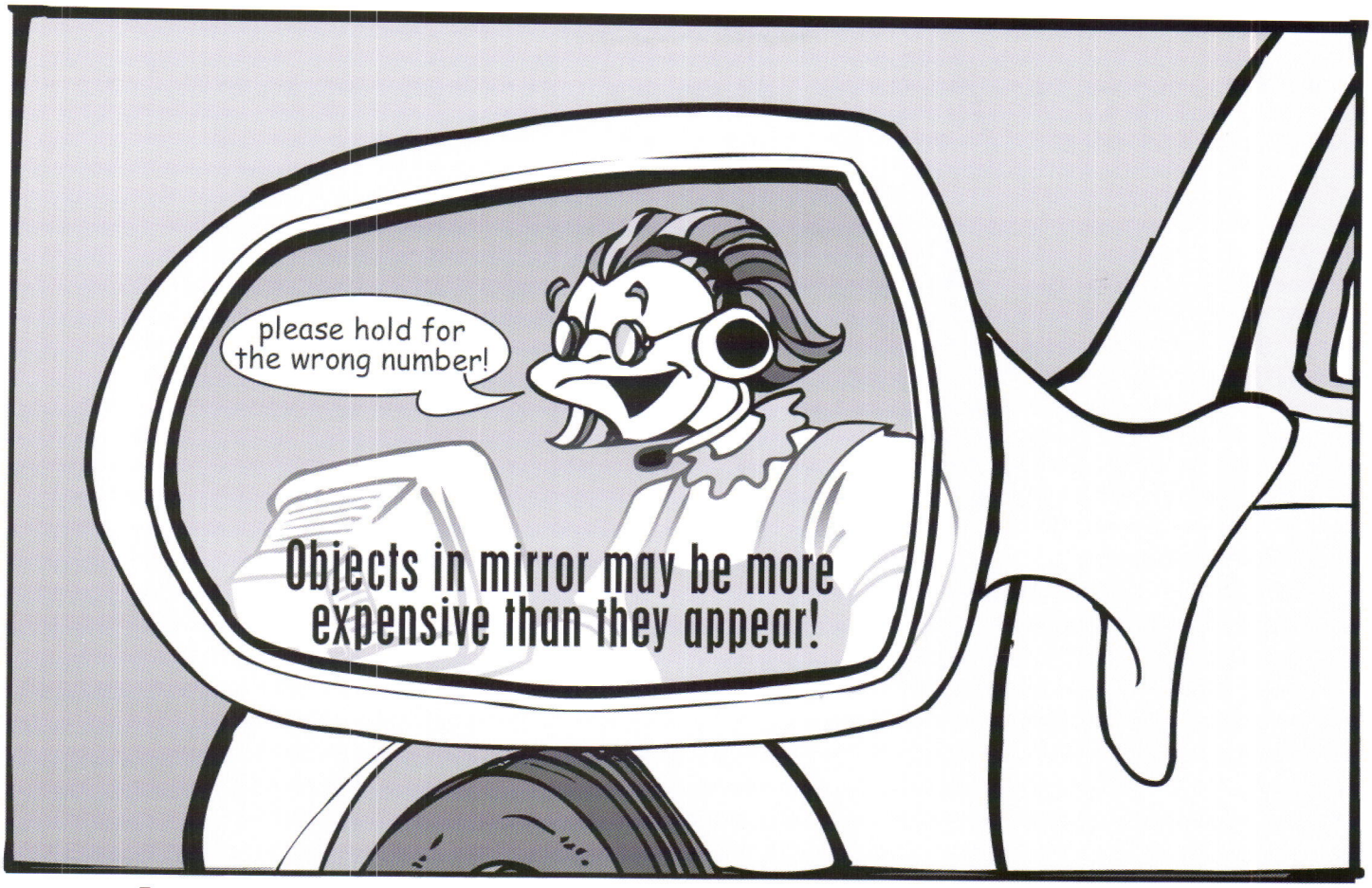

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Show Me the Money—Entrepreneurs on Campus

Supporting Student-Owned Businesses Can Be a Win-Win Proposition

by Megan Statom
ACUTA Communications Assistant

According to a survey released by JobTrak.com, 50 percent of more than 2,000 college students and recent graduates surveyed expect to become millionaires. Twenty-five percent expect to achieve this status before they reach the age of 30.

Before you sit back and smile at the optimistic naivete of a 20-something, understand that for these young achievers this ambitious goal isn't so far out of reach. Gone are the days when becoming beyond-your-wildest-dreams rich meant choosing the right stocks and possessing vast quantities of money to invest. Many of today's young millionaires have been built by the dot.com industry.

EssayEdge, formerly CollegeGate.com, was the brainchild of Harvard freshman Geoff Cook. From first-year revenues of $10K in 1997, the company, which edits application essays for prospective undergraduate and graduate school applicants, grew to more than $50K in 1999. Cook's business received over a million dollars in funding a few days after his graduation in June of 2000. In that year, EssayEdge pulled in revenues of $350,000. The company has also branched out to include editing of resumes and business documents with Cyberedit.com.

Cook's experience is not unique. Brian Razzaque was a student at Johns Hopkins University when he began Creative Tech Concepts, now known as Vision Multimedia Technologies, an e-commerce venture that assists companies in setting up Web-based businesses. Razzaque's business venture, founded in August, 1998, had revenues of $400,000 in 1999 after being in business for just over a year.

Some Campuses Respond

What does this mean for the world of higher education? More to the point, what could it mean for telecom managers and departments?

Several schools have seen some wisdom in keeping student profits on campus. Many institutions, such as Harvard University, Stanford University, the University of Oregon, and the University of Virginia, have set up entrepreneurship centers. These centers provide necessities not always available to college students, such as office space, limited long-distance telephone use, and Internet connectivity. Payment for these services varies from campus to campus. Some schools require a stake in the student ventures being supported; others ask that students pay a fee to use the centers.

The Lundquist Resource Center at the University of Oregon

Harvard University and Stanford University each rank among the five best in the nation in terms of the entrepreneurship programs according to *US News and World Report*. Harvard's version of the entrepreneurship center, called simply Tech, offers expert discussions on the leading technological trends in today's entrepreneurial world. Tech, founded in late 1999, is a place for students, faculty, alumni, and industry leaders to come together to learn from each other and collaborate.

Cook feels that such a center would have been extremely helpful when he was founding CollegeGate. "I would have benefited," he states. "Spaces, phones, and connectivity are a real plus to a struggling early business. A center would have let me focus more on the business without distractions."

Stanford's Center for Entrepreneurial Studies provides office space, a conference room, and research resources for business school alumni and current students on a day-to-day basis. The center also provides computers with access to the Internet, venture capital databases, and company information. Stanford is furthering the effort by joining with corporate partners to launch the $20 million Center for Electronic Business and Commerce. This will be a hub for research, course development, student resources, and interaction with industry practitioners.

The University of Oregon's Lundquist Resource Center provides young entrepreneurs access to a wide array of data, software, and publications on everything from entrepreneurial management to marketing to capital information. The center houses more than 1,000 books, videos, audiotapes, periodicals, case studies, and articles in order to keep students abreast of the latest information in the entrepreneurial revolution. The Lundquist Center sponsors several activities and services, including the Lundquist Summer Internship Program in which students are placed in paid internships and work on a designated project for an emerging firm.

At the University of Virginia, entrepreneurial support comes under the title of Progressive Incubator, a program of the Batten Institute. The Institute succeeds the Batten Center for Entrepreneurial Leadership and plans to expand on the missions of that center. The Incubator is an educational process that will aid a dozen or so business ventures in development and place students in a position in which they can properly seek third-party investments. It offers office space, telephone service, and Net access, as well as summer stipends and limited expense reimbursement.

Just Say No?

There are issues to be dealt with for schools that do not offer an entrepreneurship center. Many schools have policies forbidding students to run businesses from their dorm rooms. However, with today's technology, students can (and do) run these enterprises with computers and cell phones quietly and without detection. Students may use tools such as nonschool ▶

Internet addresses and off-campus post office boxes in order to remain undetected in schools that forbid student-run businesses.

Beyond the matter of simply breaking the rules, Dave Barta, associate director of business affairs at the University of Oregon, feels that there are problems dealing with the potential for cost on behalf of the school to support these dormitory business ventures.

"Commercial applications can become real bandwidth hogs and suck up resources," says Barta. "So universities, if they choose to allow student businesses, will need to find a way of monitoring, metering, and/or limiting the bandwidth available for these applications." Inbound circuits of a data circuit are often extremely busy because of students downloading various files, pictures, and data from the Internet. When students operate a Web site, they use the outbound circuits to send data out to people who wish to view the information. When students' commercial Web sites begin to take up too much of the bandwidth, it causes problems with Internet connectivity.

In addition, most dorm rooms are wired for one or two telephones and some Ethernet drops. A student using a dorm room as business headquarters may wish to change the wiring in these rooms, an added cost for the school. And what happens when this particular student graduates? Does the school pay again to have that extra wiring removed and the wiring returned to standard?

Power usage is a related issue. Are students placing several computers, printers, and copiers in these rooms? Are extra outlets going to be needed in order to keep the fire marshal happy?

Another concern is liability. "It's one thing for the network or phone system to go down so that students can't send e-mail, surf the Web, or call Mom," states Barta. "For the student entrepreneur, a network failure could be a disaster. This could mean losing revenues, for which he or she may seek compensation from the service provider, which is, most likely, the campus telecom department. What kind of policies will be put into place to deal with this matter?"

All of these potential pitfalls need to be addressed when developing a policy regarding student-run businesses.

"The bottom line," Barta says, "is that if a university specifically allows student businesses in the dorms, it probably has to deal with all of these issues. If the university specifically disallows student businesses, it avoids the issues but can make students mad and may also have to deal with them doing it anyway."

Division 17

An entrepreneurial center provides an excellent opportunity for the campus telecom department to gain recognition and form new alliances by working with other departments to bring such a center to life. At the University of Oregon, the College of Business approached the Telecom Department for help in transforming one of the buildings into a structure that would accommodate the needs of student entrepreneurs.

"They approached us," states Barta, "and we cleaned up the infrastructure of the building and explained how the phones and Internet access should be set up."

The difficult part is being sure that your department will be involved. It is important that the telecommunications plan be incorporated into the master plan early in the design of a building.

"A lack of coordination among the plans results in cost overruns, change orders, delayed occupancies, and blown project budgets, all of which can become the 'fault' of the telecommunications department," warns Tom Rauscher, president of Archi-Technology, LLC.

Construction Specifications Institute (CSI) publishes a document called MasterFormat™, which has been used by the design and construction industry for years to organize the requirements for a new building. MasterFormat has 16 divisions, each division addressing aspects of construction, including conveying systems, mechanical, and electrical.

Recently, a 17th division was proposed in order to ensure that telecommunications requirements are included in MasterFormat. Division 17-TACS (Technology and Communications Systems) is designed specifically for organizing telecommunications requirements during the design and construction of a new building. It may be used to organize cost estimates as well as project specifications.

"By adding this division to MasterFormat early in the planning phase of a particular project," says Rauscher, "the telecommunications systems can be integrated into the process of designing, constructing, and maintaining a building."

Currently, the proposal for Division 17-TACS is under consideration by the MasterFormat Expansion Task Team. The actual

division has not been added officially to MasterFormat, but the necessity of this revision has been recognized. The team will make their recommendations by the end of 2001, and the new MasterFormat will be released at the CSI convention in April 2003. A draft of Division 17-TACS may be viewed online and downloaded at www.Division17.net. With the addition of Division 17-TACS to MasterFormat, telecom departments will find it even easier to participate in the development of an entrepreneurial center.

If We Build It, They Will Come

A resource such as an entrepreneurship center has the potential to turn lemons into lemonade. Students have a professional setting in which they may test their business ventures, a place specifically designed to handle the operations of a business, including massive Internet traffic and power usage. Schools benefit not only from the decrease in possible student-run business problems, but also from the revenues that can be raised.

Geoff Cook agrees. "I think the schools will make back many times the amount spent on the center through alumni contributions," he speculates. "If I felt that Harvard had played a crucial role in the success of the business and I had an extra million to donate, I would definitely want to give back to the program that helped me."

The concept has the potential to provide an attractive resource for students. It also offers an opportunity for telecom and business departments to collaborate on a project with potential benefits for both. Students gain access to sophisticated services that they might not be able to afford on their own; colleges and universities get to mold future business leaders (who are, let's not forget, soon to be supporting alumni), and telecom departments gain visibility and generate revenue for the services provided.

Megan Statom is the ACUTA communications assistant. She is a student at the University of Kentucky, but she does not operate a business from her dorm room. Reach Megan at mstatom @acuta.org.

IT and Return On Investment

by Jim Romeo

A spreadsheet can say anything. That's the problem. When it comes to return on investment (ROI) calculations, large-scale IT projects are difficult to justify.

In commercial enterprise, traditional purchases are justified by a return on investment. A new machine helps make widgets quicker and cheaper, thereby directly impacting the profit per unit. A new truck delivers goods that bring in revenue and saves the cost of hiring a carrier. These examples are concrete and make ROI considerations easy.

ROI for information technology isn't as easy.

What clouds a return on investment for IT expenditure is the loose and often intangible benefits derived from it. Add to this the not-for-profit aspect of the higher education arena and ROI determination is difficult—though not impossible.

Monetary Return

For colleges and universities, it's not always about revenues or savings in operational cost; it's about research dollars.

Take Emory University in Atlanta, Georgia, for example. Jerry NeSmith is an IT manager at Emory. He has millions of dollars in government grants depending on him.

The amount of building space Emory devotes to research is directly related to the dollar amount in grants the university's research departments receive from agencies such as the National Institutes of Health (NIH).

Agencies like the NIH consider expenditures such as utilities, operations, maintenance, and equipment costs when calculating grants, but only if these costs are documented in detail. Accordingly, the university needs detailed records of the cost of building space devoted to research to qualify for further funds. They rely on the IT staff for help in doing this.

NeSmith spearheaded the university's investment in Facility Information Systems, Inc. (FIS) software. The software generates

precise information on how its building space is being used. A one-percent difference in estimated costs can mean as much as a million dollars in grant money. The tool is able to assess and compute data for about 4 million square feet of space.

In Emory's case, there's a clear return on their investment in the FIS software. By using that tool, the university ultimately receives millions in grants. The upfront investment in the software solution reaps a hearty back-end return.

It is also research dollars that provide a monetary return for the University of New Mexico. Their supercomputing system, Los Lobos, is actually a "super cluster" of servers, which are powerful computers that manage networks of other computers. Los Lobos consists of 256 IBM Intel-based servers, linked together using special clustering software and high-speed networking hardware, acting as one to process at a speed of 375 gigaflops, or 375 billion operations per second. That speed would place Los Lobos at number 24 on the world's current list of the top 500 fastest supercomputers.

The system has been in place and operational for over a year and is used to make advances in areas such as medicine, physics, chemistry, and genetics.

The Los Lobos configuration was attained at a low cost of nearly a quarter of traditional supercomputers. It also uses the Linux alternative operating system, allowing researchers and developers access to computational power they previously could not afford.

Like a commercial enterprise, the University of New Mexico has a clear monetary return from the research dollars flowing to the University because of their technology.

Nonmonetary Return

Not all IT investments can be as clearly tagged with a monetary return. That was the case at Texas A&M when the institution was trying to improve their registration process.

"We were tasked with building a modern Web-based student class registration system for Texas A&M University," explains Dr. Timothy Chester, a project manager for distributed software applications in the Computing and Information Services division of Texas A&M University in College Station.

"Students who were used to dealing with the University's aging telephone-based touchtone registration system, which had only 120 ports for 44,000 students, had long resigned themselves to frustrating busy signals and delays. Clearly, any new system would have to be faster, more reliable, and easier to use.

Chester explains that this was only the beginning of the development team's challenges. Not only did the team have to find a way to access student information maintained in a legacy system on an IBM 3090-class mainframe, but they had to do so in a way that was as "platform-neutral" and "object model-neutral" as possible, to foster future systems development.

They found a solution with Software AG's EntireX Broker. The XML-based integration tool acts as a gateway, allowing developers to work with code from a variety of sources and reuse existing code to speed development time and reduce errors.

"One application involved developing a Web page where students could check the status of their admission applications," explains Chester. "The University receives about 25,000 applications per year, and once the system was in place, the level of phone calls and e-mails concerning status dropped significantly."

The ROI from the new IT tool is clear. It included

- a more efficient student registration system, which was able to serve thousands of students simultaneously;
- a significant decrease in phone calls and e-mails to university administrator's staff;
- accessibility of critical student information through a Web interface by a variety of university staff;
- a 50 percent reduction in systems development time;
- an overall more productive staff.

Sound good? The benefits are clearly attractive. The only problem is that it's difficult to quantify what a decrease in phone calls translates to. How much is an overall more productive staff worth? How much is a decrease in e-mails to the administration staff worth?

What happened at Texas A&M is more often the norm when it comes to ROI. The intangible and nonmonetary benefits are abundant. Important as they are, they're not as useful when selling IT investment internally.

Unavoidable Expense

Monetary or nonmonetary, return isn't the best way to describe why some IT investments are made at all. Often a new IT system, tool, or product is to keep up with the pack.

"Sometimes there are projects that must be done no matter the cost so that the University can remain competitive and entice student, faculty, and research grants," according to Kelly Deaver, an engineer for Remedy IT Service

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Maximizing Your Investment

For a college or university, what components should be considered in determining the ROI?

The ROI exercise always involves considerations of just what the return is and what it's worth.

Remedy IT Service Management solutions are in use at several major universities, including Berry College, Duke University, Northwestern University, Stanford University, University of Alaska, University of California–Berkeley, University of North Texas, and University of Utah.

Kelly Deaver, an engineer for Remedy, has outlined considerations in answering the question any prudent provost might ask: "What's all this money buying us?" Here are her top four considerations:

1. Reduced learning curve for new support staff. Most universities use students as a staff resource for running their support centers. This means there is a lot of turnover as students graduate or move on to other jobs. This also is noticed in the client base served. At least one-fourth of the clients (students) are new each year. If you have untrained student staff trying to help new students, you can have very low customer satisfaction. Remedy provides an easily learned interface and the ability to store and easily retrieve knowledge used to resolve issues.

2. Increased customer satisfaction. This is usually measured through satisfaction surveys. Top technology attracts and keeps students, faculty, and researchers. Institutions of higher learning are viewed as the nucleus of intellectual development. As such, the users or customers expect reliable and capable technology. When they get it, it translates into grants, enrollment, and teaching talent.

3. Productivity. The ability to reduce the number of support staff or to support a larger number of clients with the same number of staff is key. Budget is always bottom line to a university. If the process for managing IT needs is streamlined and allows for lower expenditure, it is a positive ROI.

4. Increased ability to track and maintain assets. Each semester a transition takes place. Labs and offices are moved or reassigned. Clients come and go. If assets are not tracked carefully, they "disappear" or are misplaced. By tracking asset maintenance the IT department can more closely identify assets that should be replaced rather than doing a blanket replacement of all assets of a given type.

Management and formerly a help desk manager at the University of Oklahoma's College of Engineering. This might include wiring the dorms for network connectivity, upgrading systems in the engineering labs for class and research use, upgrading software to the latest version. These have to be done and are usually done over a short period between semesters. They're the things that are examined in attracting talent to teach and attend an institution.

Having new, updated technology is important. Maintaining it is just as important. Investment in maintenance and service level is key in making users happy.

"Expenditure on networks is an unavoidable expense," according to Professor Edmond S. Cooley of Dartmouth College in Hanover, New Hampshire. "We simply have to provide increasing levels of service because our researchers, and more generally, the user community, expect that new modes of communication will continue to evolve. Inclusion of video within e-mail, for example, is already happening. Since the network is not a money-making proposition, we are less focused on ROI, and instead, on QoS [quality of service]. On the other hand, to keep the network from simply being a money pit, we charge enough to cover immediate expenses such as T1/T3 line leases, plus payoff the investment ahead of the next major upgrade."

QoS can make the difference in a student or staff member choosing one university over another. What's that worth?

A lot! But it's difficult to quantify. Anecdotally, it's useful. In calculating ROI, it's of little use.

What Is the Investment?

Return on investment is a measure of what the payback is

from an investment. But just what is the investment? It's the plight of the financial analyst who calculates ROI.

There are up-front sunk costs. Then there are ongoing costs that factor into the ROI consideration. This may be the initial cost of installation, direct cost of the good or service, and a flow of funds that may come once the infrastructure or project is in place. It's important to delineate them and ensure you're including them in a calculation. Accounting for the total cost of an IT investment can be tricky.

"At Dartmouth, there is an annual per-port fee charged for every port on campus," says Professor Edmond S. Cooley of Dartmouth College. "This charge is based on how many years are to be spent to amortize the loan for the installation, to purchase new equipment as needed, to provide for spares such as L2 switches, and to pay monthly charges such as T1/T3 lines and modem banks. Typically, the college will put up the funds for a new installation and then bill the users for port access. The departments are billed on a per-port basis. The students are billed via tuition."

An IT investment may also be intangible. Take the case of Carepackages.com. The Fairfield, Connecticut–based firm provides care packages through more than 25 different university Web sites. They partner with universities and, in most cases, don't charge universities for their services.

Instead, they earn on the sale of their products to parents, students, and anyone else who sends care packages. The university receives a percentage of sales generated from the sale of care packages as an affiliate to the company. They do, however, invest space, time, and the University identity when they partner with a firm such as Carepackages.com.

"We offer a seamless way for visitors to send care packages without taking visitors away from their site," explains Ryan Moran, a principal with the firm. "The result is that the intangible investment by the institution of Web memory and presence is rewarded with the monetary benefit of a sales commission, plus the goodwill of the care package service. Universities love it because they're always questioning the return on IT investment. In our case, the investment is nonmonetary and intangible, but the return is a monetary check!"

Monetary or not, ROI is something that requires consideration and thought. The benefits must be sorted out carefully, and the total cost of ownership is the key.

"The key to success is building a plan in which people, process, and technology are not mutually exclusive," says Allan Frank, president and chief technology officer of Answerthink, a consulting firm involved in many IT implementations. "If you implement technology and don't pay attention to the impact on your entire business, you will never maximize your investment."

Jim Romeo is a freelance writer based in Chesapeake, Virginia, who focuses on IT topics. He is the author of Net Know How *(2001, Aegisbooks.com).*

Implementing IP Telephony

Campus Networks Need Careful Planning to Realize Technology's Rich Potential

by Kiyoshi Kasahara

Fujitsu Business Communication Systems

IP telephony, or voice over Internet protocol (VoIP), has been the most discussed technology in the telecommunications industry for several years now, presenting an exciting new choice for campus networking needs.

In addition to cost savings and facilitation of network management, one of the obvious benefits of VoIP is the use of a ubiquitous network to extend voice communication applications. Currently, a TDM (time division multiplexed) network has many limitations such as distance, limited bandwidth, broader connectivity, and the sharing of an information path with IT components. Adding IP telephony solutions to a network can eliminate many of these limitations.

Four Steps to Implementation

There are four key steps to implementation of a VoIP network. They are as follows.

1. Examine the Network: Because IP telephony assumes an underlying IP network, the first step for voice implementation is to examine the current network. Underutilized packet networks that can sustain a high QoS (quality of service) are good candidates for voice applications. Because the reliability and maintenance aspects of data networking are quite different from voice networking, a campus needs to examine the types of voice applications to be used on an IP network.

Non–mission-critical voice applications can be implemented onto many current IP networks, but if there will be a significant amount of voice traffic on the campus IP network, the network must be re-examined, and revised service expectations set for voice users. Network administrators also need to define the gateway position to interface with both the VoIP and the TDM networks.

2. Identify the Objectives: Although there are many benefits to introducing VoIP into a campus network, there are also certain sacrifices to be made, depending on the choice of platforms. Clearly identified objectives, such as reducing multiple network costs or simplifying management and administration tasks, will lead to a successful VoIP implementation.

3. Choose the Platform: One option is to introduce an IP-enabled PBX. In many cases, the need for preserving the multitude of Public Switched Telephone Network (PSTN) interfaces and existing applications requires a PBX as an IP gateway to the PSTN. This option also retains the service features that most users are accustomed to. A legacy-based, IP-enabled PBX has both IP trunk and line for both WAN and LAN connectivity.

Another option available is a server-based IP-PBX. Such a software-based system is designed to use the power and functionality of IP. It takes advantage of the IP network as a switching fabric externally, eliminating an internal fabric. Also, the use of a commonly available operating system enables many networking applications to be integrated on a single server or in the server farm.

4. Design the Network: An educational environment is often a mix of different types of users and applications. Also, the interfacing networks vary depending on the sites and how these networks evolved.

Therefore, when introducing VoIP, a campus must have an integration and migration plan to cope with the changes and development.

Not Just Long Distance Anymore

There are a number of IP telephony applications available today, such as VoIP trunking, remote accessibility, and converged applications. Although it is still true that colleges and universities can save money by sending long-distance voice calls over an IP network, this is no longer the major feature.

VoIP trunking offers many compelling opportunities. The flexibility of IP and the right choice of platform allows a campus to create intelligent private networks over IP, giving users all the benefits of transparent networking, such as uniform dialing plans, name and number display, and centralized voice mail, without the associated costs of dedicated TDM transmission facilities or a specific service provider's VPN. This flexibility allows support of different locations' sizes and traffic patterns using the IP network, in turn eliminating the cost of dedicated services.

> The rule of thumb is that when the application and connectivity are mostly IP, then IP telephony makes sense. When the application and connectivity are mostly PSTN-based, traditional voice networking is still smarter.

IP connectivity between a campus network and a remote network—whether over fiber, wireless, or copper—can be readily utilized by VoIP. This is extremely useful for remote sites with a small number of users, or users who use Centrex or stand-alone key phone systems. With IP, remote sites such as alumni offices or off-campus offices can be connected and integrated with the main backbone system and receive all the voice communication benefits of the main campus.

Unified messaging, a shining example of a converged application of voice and data, has now evolved to cover many different user devices and modes of communication. These traditionally separate and discrete applications can be stitched together, sharing the same control signaling over IP and eliminating the need for separate serial links and converter servers. Nontraditional user devices, such as wireless PDAs, as well as traditional telephone sets can be integrated with VoIP. Because these devices are connected via IP, the controlling application servers can deliver calls, messages, and any type of information to user-defined devices. The use of LDAP (Lightweight Directory Access protocol) and directory servers along with these devices enables easy access to the destination parties and information.

Implementation Issues

A number of issues must be addressed in any deployment of IP telephony. The major issues are reliability, PBX functionality, network availability, the total cost of ownership, and connectivity.

- Reliability is always an issue in voice communications. If a voice network goes down, it almost always means a significant loss of time and money. Legacy IP-enabled PBXs have a proven history, in most cases, with a very low downtime. This is due in part to their use of proprietary operating systems with closed-end integration of applications. IP PBXs are relatively new to the market. These server-based platforms have been designed to operate on either UNIX or Microsoft NT operating systems. The advantage of an open-standard operating system is the ease of introducing other applications in an integrated fashion. But this flexibility also introduces the potential for lower reliability than legacy PBX systems.

When choosing a platform, an administrator must examine the needs of the users and the facilities associated with it. For a main campus location, the safer choice is an IP-enabled legacy PBX, for its reliability. This reduces fears that the main campus platform may go down and take the entire campus network with it. For facilities or buildings where communications may not be as critical, a server-based IP PBX might be the best and most cost-effective solution. Although IP PBXs are usually reliable, if there is concern about downtime, a campus can also implement a redundant server configuration to improve reliability.

- When it comes to PBX functionality, legacy IP-enabled PBXs are TDM-based platforms that are familiar and have most of the features and functions important to a campus environment. IP PBXs are flexible server-based platforms that take advantage of

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call control fully utilizing the IP network as a switching fabric. A drawback with these new-to-market systems, however, is the need to play catch-up in developing mature legacy PBX functionality. Today, even the most feature-rich IP PBX lacks some of the features available in a typical legacy PBX.

- A benefit of VoIP is that both voice and data are sent as packets on the same network. Because packets with different types of payload can use the same network, network usage is highly efficient. But this introduces unpredictability into the available bandwidth equation. For this reason, it is necessary to plan for ample bandwidth in order to secure the desired quality of voice.

Also, the network should be interoperable, with a QoS scheme for voice priority over data. And if video is used on the same network, the QoS engineering team needs to plan and measure the network carefully for traffic optimization. To cope with network unavailability, consideration for bypassing traffic to other routes is always advisable. Careful planning and testing is recommended before deploying a VoIP solution so the network is not overloaded. A partial deployment into a network, confirming the network attributes, is a safer approach.

- In assessing the cost of ownership, remember that data networks have grown rapidly in the recent years, both in magnitude and capacity. Because of this growth, the data network has been designed and maintained with the latest products, replacing older systems. This IT approach contrasts with the common telecom practice where interoperability, compatibility, and investment protection are emphasized.

While VoIP tends to be more expensive initially, it significantly reduces the running cost and subsequent addition of newer devices. Also, costs vary widely depending on the interfaces. The rule of thumb is that when the application and connectivity are mostly IP, then IP telephony makes sense. When the application and connectivity are mostly PSTN-based, traditional voice networking is still smarter. Most campus environments fall somewhere in between, making it necessary to consider a mix of solutions for optimal networking.

- The PSTN is the standard for the entire global network. Without careful planning, a campus can implement a VoIP network and then have limited access to the PSTN, creating an island lacking sufficient access to the outside world. Before implementation, an administrator needs to examine closely the institution's usage of the PSTN.

Legacy IP–enabled PBXs can serve as the gateway to the PSTN, bridging a campus VoIP network and the PSTN. In most cases, IP cards can be easily added to a legacy PBX to support the necessary traffic to the PSTN. On the other hand, server-based IP PBXs use external gateways. In an ideal campus infrastructure, a campus will network the IP PBXs to the IP-enabled PBX, which serves as the gateway to the PSTN. This route reduces cost and simplifies management by using a single gateway for the entire campus.

Some other issues to be addressed include lack of feature sets, functionality, redundancy, QoS, interoperability, and more, emphasizing the need for investigation before making a commitment to VoIP.

Designing A Solution

Despite some potential sacrifices, VoIP offers some obvious benefits, including expanding voice communication by taking advantage of the ubiquitous IP networks. This provides additional choices for network designers. It's important to understand and mix IP-enabled PBX solutions and server-based IP PBX solutions where they are most appropriate. Knowing the benefits and disadvantages of both systems provides a good foundation when deciding the best solution for your site.

Here are some potential uses of these combinations for colleges and universities.

For general buildings on campus where a number of users concentrate, an IP-enabled PBX provides a solid foundation for converged communications. Typically, this provides a campus with connectivity to diverse carrier networks, such as local and long-distance service providers and wireless carriers as well as Internet and application service providers, and fiber connectivity.

An IP-enabled PBX can provide a scalable gateway to these networks and serve as the internal private network for both IP and PSTN. This backbone network is a critical element of the campus operation, which requires nonstop operations throughout the year. The reliability and robustness of a legacy PBX suits the needs of a typical campus environment. An IP-enabled PBX can accommodate IP trunking and IP phone connectivity alike, providing all of the IP benefits.

Alumni offices and department buildings that might have a high ratio of office movement and don't necessarily need mission-critical communications might benefit from a server-based system. As professors and department workers move classrooms or offices, they can take their IP phones with them, and the PBX will not need to be reprogrammed. All their internal calls to other buildings and classrooms can be sent over the internal IP network, and their external calls can be routed through the IP-enabled PBX at the main location.

Dormitories present interesting challenges. If students are expected to supply their own analog off-the-shelf phones, an IP-enabled PBX may be the best fit as a gateway, even when the dormitories are connected to the main trunking facility through IP. A PBX and call-accounting solution can allocate the cost to be charged back to the individual users. A more interesting application may be to loan IP phones to individuals who could use them throughout the entire academic engagement, even when they relocate to different rooms or dorms. With this type of solution, students can keep the same phone number through their entire stay on campus, and there is no need to manage moves and changes.

A broadband intercollege network provides a huge potential for VoIP. With proper traffic management and QoS, voice applications can be sent over the existing broadband network, and all campuses can communicate via voice, video, and fax over a single network.

On-campus wireless is another intriguing application that is powered by IP. The marriage of wireless voice and wireless LANs based on the IEEE 802.11b standard provides an integral platform for VoIP and wireless applications. Both wireless handsets and data-entry devices can share the same access points that cover the desired area on campus, providing roaming capabilities. This will allow all wireless applications to run on IP and use a single, standard access point. The VoIP wireless-LAN standard further evolves into IEEE 802.11e, where the voice priority is managed among access points and wireless handsets. The IP telephony platforms (IP-enabled PBX or server-based system) will be able to integrate directly with the wireless application.

The "Internet Age" should include video in academic studies, regardless of time and location. Many campuses have studios for creating video content, storing video archives, and delivering video in real-time streaming capabilities. These videos can take several formats, such as MPEG1, 2, and 4; Quicktime; and Microsoft Media Player. Of special interest is the emergence of MPEG4, a new compressed video that makes it accessible with VoIP and wireless LANs.

Conclusion

The IP networking evolution is largely analogous to mainframe and client/server systems. Once-dominant mainframes have evolved to become vital Internet servers and Internet data center components. Client/server systems have proliferated with the expansion of LANs and the broad range of network-based applications. IP telephony clearly offers rich potential. It is the users' vision and dynamic transition that makes the difference.

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Rate Development/ Cost Modeling at UT

by George Denbow
University of Texas

All colleges and universities, whether state supported or privately funded, must establish a cost model with rates that will recover adequate revenue to efficiently operate their telecommunications infrastructure.

The University of Texas (UT) at Austin installed a Nortel SL100 switch in 1982 at a cost of $4,500,000. Initially, the system contained 7,500 lines. Funding for this capital expenditure came from accumulated cash balances carried forward over previous years of billing departments for services. Since initial purchase, the telecommunications department has spent approximately $25,000,000 on software and hardware upgrades. Current average annual cost to maintain and upgrade is $350,000; current line capacity is 30,000.

UT Profile

Some background of the Telecom Department is helpful before discussing how rates are established. Voice services are charged to University departments on an annual basis at the beginning of the fiscal year in September. Adds, moves, and changes are billed monthly on a pro-rata basis. The department employs approximately 130 staff, of which 50 are involved in installation. The annual budget is $11,000,000, with approximately $3,125,000 used for payroll. Only $1,650,000 of the annual budget is state funded.

Enrollment at the University in September 2000 was 50,000, of which only 6,800 were in residence halls. Each room has one voice and two data connections. The cost of service for students in the residence halls is included in room and board and is billed by the housing and food departments. Student long distance is a negligible income factor since only 1,200 students purchase their long-distance service through telecom.

There are approximately 14,000 staff and 12,000 faculty with 23,000 lines currently in service. Most faculty and staff have DID service, but some key systems still exist. Fewer than 100 VoIP phones are in use. Elimination of key systems and implementation of additional VoIP systems are ongoing. The vast majority of equipment currently in use is Nortel compatible, moderately priced, single-line analog and digital.

Local service is provided by SBC with 700 circuits, half incoming and half outgoing, currently installed. Long-distance service is regulated by the state through the General Services Commission and currently is provided by AT&T. There are 184 long-distance circuits currently in use.

Figuring the Costs

Costs for voice service are based on type of service as follows.

- Dorm line: a single line installed in the residence halls. Students provide their own phone and can call on and off campus. Long-distance calls must be made using a long-distance service.
- Campus-only line: a line commonly referred to as a *house phone*. Only local calls terminating on campus can be made from these lines. Long-distance calls can be made if the caller has an authorization code.
- Campus-only with message waiting: a line with the same features as campus-only but with voice mail capabilities.
- Analog line with message waiting: a line capable of making local calls on and off campus, plus long distance calls with an authorization code. Message-waiting capability is also available.
- Digital line with message waiting: digital line with all features available.

Voice mail is billed separately and offers three mailbox sizes: a 10-message box, a 25-message box, and a 50-message box. Lines, equipment, voice mail, and all chargeable features are priced monthly and billed annually at the beginning of the fiscal year.

Technicians, who work for the University, perform all installations. We charge to write an order, install a line, or install voice mail, plus a trip charge. Labor rates are established based on average hourly rates plus fringe benefits. These rates are updated annually.

A cable price has been established using R.S. Means Cost Works. It allows for input of all data related to labor, building type, and number of drops, and produces a price list that is accurate and easily read by our customers. It has been a tremendous asset in giving price estimates for cable jobs.

Rate elements include the following information.

- Trunk charges: gross annual billing by LEC
- Number charges: gross annual charge for numbers used by the University
- Administrative costs: all administrative salaries plus fringe benefits and longevity
- Switching system maintenance: all switching personnel salaries plus fringe benefits and longevity
- Outside plant maintenance: based on historical annual costs
- Switch expansion/replacement: based on historical annual costs
- Outside plant expansion: a budgeted amount based on input from Engineering
- Contingency and rounding: an amount included to cover unexpected needs

Although it might be perceived as a violation of anti-trust regulations to print the specific dollar amounts, Table 1 on page 32 shows how this looks. This method of rate setting has been in place since the switch installation in 1982. When costs change appreciably, the "Proposed" group of columns allows for a "what if" computation. If rates are changed, the change coincides with the beginning of the fiscal year. Rates have remained steady for the past five years.

Additionally, labor and materials orders are billed at actual cost for materials used and hours charged to the job. These types of orders generally relate to repairs of duct banks and other noninstallation-type orders.

Equipment Prices

Equipment prices are established following similar guidelines. All equipment is Nortel compatible. Both new and refurbished sets are used, and all equipment is fully guaranteed.
There is no charge to replace sets that are not functioning properly. Both analog and digital equipment is installed on single and multiline orders. Equipment is offered for rent on a monthly basis, billed annually, or available for purchase at a one-time cost with a small annual maintenance fee.

Table 2 is an example of what factors are used to set equipment prices. The information for each column in this table is derived as follows.

- Item description: manufacturer's model number
- List cost/unit: manufacturer's list cost
- UT-estimated cost per unit: low bid on the annual blanket purchase order issued each fiscal year
- Estimated recovery period: a factor in months based on historical information

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Rate Elements	Present: Element Contribution Monthly	Present: Monthly Revenue	Present: Annual Revenue	Proposed: Element Contribution Monthly	Proposed: Monthly Revenue	Proposed: Annual Revenue	Change: Annual
Trunk Charges							
Number Charges							
Administrative Costs							
Switching System Maint.							
Outside Plant Maint.							
Switch Expan. & Replace							
Outside Plant Expansion							
Contingency							
TOTALS							

Table 1: Itemized rate worksheet

- Estimated useful life: period of time used to recover all costs associated with the purchase
- Monthly capital recovery: UT-estimated cost divided by useful life. (This is the first of three amounts used to determine the monthly charge.)
- Average annual labor: cost of one hour of labor based on a loaded labor rate
- Monthly labor allocation: useful life divided by 12 months times average annual labor times loaded labor rate divided by useful life (This is the second of three amounts used to determine the monthly charge.)
- Probability of major repair or replacement: factor expressed as a percentage, based on historical data of the frequency of repair or replacement
- Monthly repair allocation: list cost times repair/replacement factor divided by useful life (This is the third of three amounts used to determine the monthly charge.)
- Calculated monthly charge: the actual sum of the three amounts (The amount rounds up based on the number of decimal places in the cell.)
- Proposed monthly charge: an amount equal to the calculated monthly charge rounded up to the nearest $.25
- Calculated monthly maintenance: monthly labor allocation plus monthly repair allocation
- Proposed monthly maintenance: calculated monthly maintenance rounded up to the nearest $.10
- Saving due to purchase: proposed monthly charge minus proposed monthly maintenance. (The amount the customer will save per month if sets are purchased.)

While the table may seem complicated at first, it is an effective way of keeping close watch on all costs associated with a particular set. Amounts can be adjusted when necessary to ensure that all changes in costs are accounted for. Price adjustments are made at the beginning of each fiscal year, if necessary. In reality, monthly charges are somewhat higher to allow for recovery of funds needed for capital expansion.

Once rates are set, all data should be analyzed to ensure accurate calculation. *All* expenses need to be considered: salaries, fringe benefits, sets, cable, fiber, miscellaneous parts, capital improvement needs, and institutional costs.

Our rate structure allows us to accumulate cash balance-forward funds that are earmarked in our budget for capital improvements. Some improvements we have funded in the past and are currently funding are unified messaging, switch upgrades, existing infrastructure upgrades, renovations to our building, a campus-wide security system, departmental server upgrades, MSAC console upgrades, satellite switch equipment integration, and line equipment hardware and software upgrades.

There are many methods used to calculate rates and establish cost models, and the one explained in this article is just the method the University of Texas at Austin uses. The most important things to remember are to include everything and make your method flexible enough to accommodate the one consistent factor in our business—change.

George Denbow is assistant director for administration, telecom and Internet services at UT Austin. This article is based on a presentation he delivered at ACUTA's annual conference in July. Reach George at gdenbow@mail.utexas.edu.

Table 2: Factors used to set equipment prices

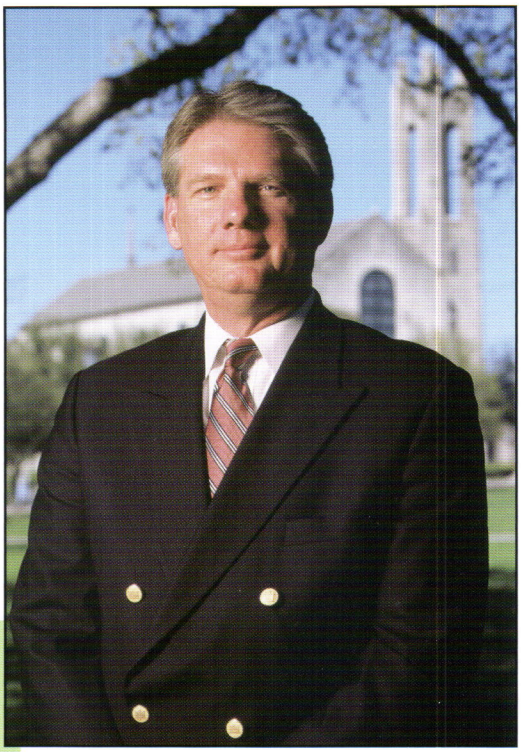
Item Description	List Cost/Unit ($)	Estimated Cost/Unit ($)	Recovery Period (months)	Useful Life (months)	Capital Recovery ($)	Labor (hrs @ $) $20	Labor Allocation ($)
AB123	$165	$130	48	48	$2.71	$0.50	$0.83
BA123	$350	$285	48	48	$5.94	$0.50	$0.83

Item Description	Prob. of Major Rep Repl/Year	Monthly Repair Allocation	Calculated Monthly Charge	**Proposed Monthly Charge**	Calculated Monthly Maint.	Proposed Monthly Maint.	Saving due to Purchase
AB123	0.33	$1.14	$4.69	**$4.75**	$1.98	$2.00	$2.75
BA123	0.33	$2.08	$7.08	**$7.25**	$2.91	$3.00	$4.25

Interview:

Jake B. Schrum, PhD

President, Southwestern University



Just before the beginning of the fall term, Dr. Jake B. Schrum, new president of Southwestern University in Georgetown, Texas, spoke with Dr. James S. Cross, former ACUTA president and current vice provost of information technology at Michigan Technological University, about his perspectives on implementing technology on the small liberal arts campus. Stressing the necessity of building community on campus, Dr. Schrum reminds us of the importance of the human touch in a world filled with technological marvels.

The first institution of higher learning in Texas, Southwestern was chartered by the Republic of Texas in 1840. Affiliated with The United Methodist Church, SU is a highly selective, four-year, independent, undergraduate national liberal arts college. Enrollment is approximately 1,300 students, more than 83 percent of whom live in residence halls on campus.

Schrum: I feel strongly about some of the issues in telecommunications on campus, especially on a campus that The Carnegie Group has designated as a national liberal arts college, and where we talk about community so much. I think there's a question as to whether all of the access to information and the ability for our students to communicate with each other electronically is actually helping or possibly hurting community on our small campus.

We believe that we need to provide everything that makes sense for us to keep our campus up-to-speed and state of the art, but of course it has to be something we can afford. At the same time, it concerns us that students can stay in their rooms and communicate electronically with other students or a faculty member who is only half a block away. Where does that leave building the kind of personal community between individuals that face-to-face interaction affords?

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That, philosophically, is a much more important issue to me than the fact that we're not making any money off of our long-distance program anymore. We're going to fund telecommunications on our campus because we think it's strategically important for us to do that. And we're going to do the very best we can do for our students to make sure they are not roadkill on the Information Highway.

ACUTA: What are your views on the strategic importance of network and telecommunications services on your campus? How do you see that role changing over the next several years as the line between business strategy and technology strategy continue to blur?

Schrum: I think telecommunications is of tremendous strategic importance to the university simply because of how the world seems to worship the idea of transmitting information and communicating as fast as we possibly can. It seems to me that especially in this country we are worshiping speed. I don't necessarily agree with that, but as the president of an educational institution where many times our students have technology capacities when they come to Southwestern and their expectations are that we are even more sophisticated, we have to take that seriously.

I think strategically we have one of the most intelligent and caring ITS professionals on our campus who is in charge of this area, Bob Paver, associate vice president for information technology service. Bob is up-to-speed on the technology, but at the same time he understands that more important than delivering information and communicating with speed is caring about people and giving them the personal touch that Southwestern has been known for for a long time and that I think the educational world is going to be yearning for in the next decade or so.

The Administration Building, the oldest building on campus, reflects Southwestern's history and tradition.

ACUTA: What are the key challenges and issues presidents, provosts, and other campus administrators face in trying to develop and sell to campus constituents an integrated strategy for e-learning, e-business, and e-commerce ? How was this strategy pitched at Southwestern so that constituents saw the return on investment and expected valued-added benefit?

Schrum: This, like other issues at Southwestern, has to do not only with how we educate our students but also how we educate ourselves on sometimes very complex subjects. If we leave telecommunications and the issues there to the experts, then we're kind of at their mercy. If they say this is the way we go and the rest of us aren't educated or we don't become educated, then we have to decide no, we're not going to do that, or yes, we are.

What we try to do at a campus as small as Southwestern is to have what I call a considerate conversation about everything that is strategically important to the university, including telecommunications. Then we make decisions based on the philosophy of what Southwestern is trying to do from an educational standpoint and how we intend to respond to and mentor our students and the people who work here who are all communicators. We set it in that context. We have conversations about it, and then we say to each other, even though the latest technological advancement is to do this, let's look at it in a critical way. We may have this bell and this whistle, but it does not make sense, because of economies of scale, for us to have these other three bells and whistles, and this is why we're making the decision. Not that we don't know that they exist, not that we don't know what they can do, but finally, we decide what makes sense for the University in terms of what we can provide our students in technology and telecommunications in the context of how we want them to acquire information and to communicate.

ACUTA: What advice do you offer to others struggling with escalating security challenges as a result of the continued bombardment of

hackers, viruses, and worms? What are the challenges inherent in this rapidly expanding arena? Are there any common themes in the thinking of presidents of educational institutions across the country on how to proceed in dealing with this troublesome challenge?

Schrum: You need to have professionals on your staff. You have to have someone who is up-to-speed on all of the issues, including things like viruses. We turn to ITS, and if ITS suggests a solution to ensure that Southwestern is going to be safe in terms of the Code Red virus or whatever, then we take their advice because they are our experts. We know that they know our institution, and we trust them. They suggest ways to educate the whole community on current issues. We're still a small-scale community, and when we make a decision, we can transmit that decision and its impact on all of us—students, faculty, staff, and alumni—in a "deal with" way that makes sense to our institution.

ACUTA: Convergence is believed by some to be a truly revolutionary step in the technology industry with the migration of different communications streams—voice, video, data, and other media—onto a single integrated network. What impact have convergence and IP telephony had on your campus? Do you have plans to expand in this direction? How can the small campus with finite resources stay competitive?

Schrum: I think I'm going to defer to Bob on this question.

Paver: We've done a limited amount of videostreaming on our campus. We had a very successful video streaming of President Schrum's inauguration last April that reached many people, particularly a lot of our alums, around the world. I am of the philosophy that convergence is still converging, and for us, at this point, we will continue to maintain our infrastructure with kind of the traditional phones on copper, video on coax, and the network on fiber and twisted pair. Some of our people in modern languages are doing some pretty exciting work with video and audio streaming for various classes, and we are positioning ourselves so that those streamed sessions can be used by students from their dorm rooms, for example, instead of coming to the labs.

ACUTA: What unique or creative e-learning, e-business, or e-commerce initiatives has your campus developed that would be considered a strategic initiative?

Schrum: We're not highly involved in any of those. We are a single campus with a very straightforward mission. People choose Southwestern because most of our students live on campus, most of our students finish Southwestern in a four- or five-year period, most of our students expect to have at least four or five professors who know them very well who can write letters of recommendation for a lifetime for getting jobs or getting into graduate or professional schools. Because Southwestern is a top national liberal arts college in America and a premier liberal arts

college in Texas, we have spent a tremendous amount of our resources to develop a rigorous academic environment in which all of our students are technologically advanced.

I've been at Southwestern just a year, and certainly I don't know as much about technology as I'd like to or as I expect to in two or three years, so I'm relying on our impressive ITS department. Bob, I'll ask for your input on this one as well.

Paver: Given our size, a lot of the more sophisticated e-business or e-commerce activities just don't scale for us. But we have done a number of things that are in line with our overall goal or mission.

One of those is that this fall we are rolling out our own campus portal system after having investigated the various commercial offerings from vendors and rejected them for cost and complexity and our desire to have a product that is special to our campus. We're going to call that "MySU," and it works like a lot of other portals. Users are authenticated coming in with their university e-mail ID, and they can customize the content of the portal. It's modular, so we will be adding modules as we go along. By this time next year students should be able to put a module on their portal that automatically brings up their course schedule, or calendar, or university activities.

ACUTA: What advice or criteria would you provide to others who are interested in creating their own portal?

Paver: You clearly have to have the resources to do it. And though we are small, I am truly blessed to have two very competent people in my network group who understand the issues from privacy and security up through the coding. Actually, a large portion of this project was coded by one of our current students who's in the Math/Computer Science Department. You have to consider whether or not you have the resources to build it and sustain it, and right now I do. I think the worst thing with our systems vendor is that their implementation of the portal is very complicated, perhaps more difficult to maintain than the one we're building ourselves.

ACUTA: How can campuses best focus on melding our society's rapid technological change with alterations and changes in demographics, cultures, processes, and practices?

Schrum: I'll go back to what I said in the beginning. Every campus needs to remind itself of the following question: What is the culture and what is the tone of this campus both in the way we work with our students especially, but also in the way we work with each other? This has to be tied to the fact that we want our students, obviously, to be technologically competent when they leave. When our students are interviewed for graduate or professional school or for jobs, I don't think the interviewer is going to spend the majority of time talking about whether the student is using the latest Palm Pilot or whatever. That assumption of basic technological competence is going to be made by the interviewer because of the quality of the institution and the student's communication skills.

Our students should be up-to-date from a technological point of view. But what's more important to us is that they understand where technology fits into the life of a person who wants to be a whole person, who cares not only about their intellectual life, but cares about their spiritual or ethical life and those things that we think are becoming even more important in a society where resources are dwindling and we're becoming more interdependent on each other both as nations and as individuals. I think what is most important for our students to learn is how to keep everything, including technology, in perspective.

For more information about telecommunications at Southwestern University, contact Bob Paver at paver@southwestern.edu.

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"Speech-Dialing" the Right Campus Connection

Campus telephone greeting: *"Welcome to Upstate University. Please say the name of the faculty, service, or person you wish to reach."*

Caller: *"I'd like to speak to Professor Jack Connors."*

Telephone greeting: *"There are two people named Jack Connors, one in the Contemporary American Literature Department and one in the Semiotics and Philology Department. Which one would you like?"*

Caller: *"American Literature, please."*

Telephone greeting: *"Thank you. Transferring your call to Jack Connors, American Literature Department."*

by Ormsby Ford and Stephane Couture

LocusDialog™

The preceding telephone scenario between a caller and a respondent seems perfectly normal. It did not, however, involve a live telephone operator. What's more, it promises to become more common on higher education campuses as automatic speech-recognition (ASR) technology is increasingly used to answer and route calls to the campus community from both internal and external sources.

Speech recognition allows computers to hear and "understand" speech signals (specifically spoken words) and then translate them into text and/or commands. A phone call integrating speech-recognition technology contrasts radically with touch-tone—DTMF or "voice-mail jail"—applications where users must carefully select from specified options or "enter the first three letters of the last name of the person you wish to reach," using the telephone keypad. Today's speech-recognition telephony applications allow callers to ask questions and request information (i.e., a person, university

department, or company location) using a normal speaking voice and intuitive language. Call it "speech-dialing" if you will.

Speech-Enabled Call Routing in Action

Speech-recognition technology has advanced beyond its original niche as an assisting technology for human-machine interaction to its mature status as a central component of the telephony infrastructure of any size and kind of organization, in particular higher education institutions. Its most common manifestation is as an automated attendant capable of performing complex call-routing duties. In a campus setting the possible applications fall into three clear categories:

1. On-campus call routing between departments, services, student residences, etc.
2. Calls to external services, other selected institutions
3. Handling inbound calls from the general public (the "frontline" service) and providing self-service information

And in a higher education setting requiring access for visually impaired students, speech-enabled call routing provides crucial flexibility and ease of use.

Speech-enabled call-routing systems connect directly to the campus PBX, KSU, or Centrex phone system through either analog or digital lines hooked up to standard computer telephony boards.

A call comes into the phone system and is sent directly to the speech-recognition system. The latter identifies the desired call destination (verifying the caller if necessary), then sends the corresponding phone number back through the PBX/KSU/Centrex system to

- an internal extension,
- a voice mailbox,
- an external local or long-distance number for a landline or mobile phone.

Speech-recognition systems must integrate user-friendly features to dispel the very human reluctance to interacting conversationally with machines, no matter how "intelligent" they may seem. Effective systems therefore incorporate an intuitive voice user interface (or VUI), a set of greetings, messages, and prompts that guide callers through an as-natural-as-possible call flow.

Since advanced systems "understand" natural speech,

An ASR Primer

The advent of fast and inexpensive computing power combined with advances in such fields as phonetics, phonology, acoustics, linguistics, digital signal processing, and computer telephony integration have meant that natural speech has become an efficient human–machine interface.

State-of-the-art ASR incorporates five main functions: speech recognition, natural language understanding (NLU), information location and retrieval, language generation, and text-to-speech synthesis for publishing information in the form of natural sounding utterances. Advanced ASR is also speaker independent; systems will recognize and respond to a wide variety of speakers with all kinds of voices, speech patterns, and accents.

In most of today's speaker-independent systems, speech recognition is done through statistical pattern recognition. In response to a given spoken query, a speech-recognition engine (software) compares a speaker's utterance to models of speech corresponding to sequences of words. The sequence of words that has the model best matching the speaker's utterance is offered by the engine as being what the speaker most likely said.

The comparison models of speech are mathematical representations of the patterns and sound changes of speech, based on Hidden Markov Models (HMMs); the latter are obtained by the statistical analysis of a large collection of speech samples spoken by many people. Words are modeled by considering each as a string of irreducible phonetic units, called phonemes, which correspond to the basic sounds of speech, such as vowels and consonants.

In speech recognition, a set of HMMs represent each phoneme—English has approximately 40—by describing the ways the latter may sound, according to the possible influences of surrounding phonemes. Building word models using phonemic HMMs permits the

callers can use conversational dialogue: "May I speak to Jill Smithers, please?" or "Is Jill Smithers there?" or simply "Smithers, please." The "barge-in" feature allows callers who are familiar with the system to ask for a name while the system greeting or prompt is still playing, significantly decreasing the transaction time.

Of course, flexible speech-recognition systems can also serve as DTMF attendants; callers can still—habits die hard—choose to reach any extension by dialing it on the telephone keypad.

Why Implement a Speech-Enabled Telephony Solution?

Are there practical (as in cost-reducing or return on investment–improving) reasons why today's resource-conscious higher education organizations should consider implementing a speech-enabled telephony solution? The principal telephony challenges facing even a small campus are well-known:

- The need for sufficient operator resources to provide 24-hour service (residences are notorious for their red-eye activities), including directory assistance;
- Maintenance of extensive campus telephone directories that quickly become out of date and are costly to reproduce;
- A highly mobile user community (picture the harried instructor-researcher moving from office to research lab to course auditorium to..., with time for message management at a premium);
- Public requirements for course information and department schedules;
- Administration imperatives to optimize returns on infrastructure investment and generate additional revenues from existing facilities.

Responding to these pressures, today's campus telecom specialists can weigh the advantages of an effectively deployed speech-enabled call-routing system, especially when it has been tailored to the specific needs of a given campus environment.

- Routine internal calls can be routed automatically, leaving live operators freer to concentrate on other frontline and administrative tasks. Industry studies have shown that in many organizations up to 30 percent of calls to the operator originate internally. A speech-enabled auto attendant can, in principle, substantially reduce this figure and considerably enhance operator cost-efficiency. As well, any speech-recognition telephony

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speech-recognition engine to recognize words it has never heard before. This forms the basis of speaker-independent ASR.

Once the speech-recognition engine has determined the sequence of words that sounds closest to the speaker's utterance, it prepares a semantic representation of the word sequence using basic linguistic, semantic, and grammatical rules. This is the NLU segment. The sentence is then formatted as binary-representation commands that the system "understands."

The speech-recognition system then proceeds to execute predetermined rules for information location and retrieval, and, more relevant to our discussion, routing calls according to users' spoken requests. Data that has been retrieved is converted into sentences, and text-to-speech synthesis software converts sentences into spoken words readily understandable by users. In the telephone call–routing context, professionally recorded voice files will often be used to dispense the required information.

Ahead-of-the-curve speech-recognition systems also use biometrics—the mathematical analysis of caller-specific physiological traits, the voice, for our discussion purposes—to correctly "recognize" users. This speaker-verification (SV) technology involves verifying a claimed identity using a person's voice. It comprises two phases:

1. An enrollment phase, during which the caller enrolls into the system and creates voiceprint models by typically speaking out short password phrases. These models are stored in the system memory.
2. A verification phase (upon initial interaction with a call-routing system, for example), during which the caller makes an identity claim by speaking. The speaker-verification system then verifies the caller by comparing the spoken claim with the caller's prerecorded password phrase.

Analyzing the characteristics of the caller's voice and then comparing these with a stored, prerecorded benchmark adds a vital extra level of security and management control over the access to and use of telephony systems resources.

system worth its salt will handle complex directory menu choices, the kind frequent in a campus setting. Callers will thus be spared the tedium of touch-tone navigation.

- Campus telecom groups acting as suppliers to different faculties and departments can generate revenues from the various personalized options available with current speech-enabled call-routing systems. In effect, telecom managers can improve the return on infrastructure investment by monetizing users' access to the following:

1. Speech-activated student and faculty personal directories
2. Speech-activated dialing
3. Secured (by speaker verification) telephony resources such as inbound call redirecting and conference calling, especially for the mobile user
4. Select off-campus commercial services (restaurants, couriers, taxis) via speech-dialed access to a designated directory (Not to be disregarded, too, is the potential for deriving income from such suppliers using a model of fee-based preferential status in the campus community.)

- With a speech-enabled call routing solution in place, users (especially faculty and staff) can set up speech-activated personal directories and access all their on- or off-campus contacts through one central number, eliminating the need for printed directories.

- Leveraging the dialed number information service (DNIS) and the calling line identification (CLID) available on digital PBXs, campuses can effectively implement multiple applications across a telephony system by dynamic port allocation, thus optimizing infrastructure use.

Selecting an ASR System

Campus telecom managers should ensure that the speech-recognition systems they are considering include a comprehensive range of software tools to facilitate initial configuration, system administration, and ongoing monitoring to enable continued error-free performance. Several important considerations are worth mentioning with regard to selecting, implementing, and maintaining a cost-effective speech-enabled call routing system:

- Systems must be able to adapt to growing needs. Available speech-recognition solutions are scalable to handle from 100 to more than 50,000 directory entries with adaptable menuing capability. And given the pervasiveness of e-mail, the astute campus telecom manager will insist on users being able to integrate their directories with current preferred e-mail contact lists.

- Systems must be compatible with existing computing platforms.

- Access via public digital networks should be possible to allow for system administration via a LAN or the Web.

- In addition to being able to easily update the directory database, designated personnel must be able to record prompts and user names. The last thing callers want to hear is a robotic machine response.

- Built-in reporting tools should provide such statistics as call volume, calls per port, call transfer success rate, call navigation details. These will help system administrators identify potential problem areas and take corrective action. Statistics should be available on a daily, weekly, and monthly basis.

And it goes without saying (but bears repeating) that the implementation phase should include thorough consultations between the telecom manager and an installation specialist. A crucial part of speech-enabled call-routing systems is the VUI. A pleasant calling experience is the ultimate objective; the campus system administrator-to-be should therefore pay close attention to the selected system's call flow design. Extensive field trials will minimize errors, particularly with first-time users.

Additional Considerations

In a telephony context, speech-recognition technology applications must result in exchanges that reflect, as faithfully as possible, the normal speech habits and cues that are part of any natural conversation. There are, therefore, several other technical features worth mentioning that an effective speech-enabled call-routing application will incorporate.

- A comprehensive dictionary: An ideal speech-recognition system will, of necessity, contain the phonetic transcription of hundreds of thousands of words in a given language, including first and last

names; university, college, faculty, and department names; company names; names of countries; cities; numbers, etc. These phonetic transcriptions may be in several languages, and since people pronounce the same words differently, a single word may have multiple phonetic transcriptions in each of these languages. A campus dictionary is, in effect, a subset of the complete master dictionary, and contains the full phone directory of campus users and locations/services, including all possible alternate names and designations. The campus speech-recognition system can thus match words uttered by callers with what it actually "knows" in its database, and even anticipate the words callers will use to reach people and services, regardless of how they are pronounced.

- Conversation templates: Speech-enabled telephony systems need to understand requests and alternate designations that are specific to the environment in which they are installed. Conversation templates must include words and job titles that are used in these environments; directory listings will not need to include such titles, but the system will recognize any request that has them.

- "Robust" speech recognition: Calls often originate from noisy environments. Speech-recognition systems must be able to filter the utterances, distinguishing between what is potentially intelligible and what is just background sound. When they "hear" something that is not part of the campus directory, systems today, like any unsure listener, will ask callers to repeat a request. Systems may even ask callers to spell out (by speaking) the name of a person or department.

- Homophone resolution: Several methods exist to distinguish between names that are spelled differently but pronounced similarly. Since this is highly likely in a campus situation, systems must be able to process multiple pronunciations of a name.

- Speaker authentication: With the fraudulent use of telephony resources an all-too-frequent occurrence, advanced speech-recognition software incorporates important capabilities for ascertaining and authenticating the identity of a caller. This technology gives highly secured access to many telephony resources, eliminating as it does the dependence on equipment or location authentication as the means of identifying callers.

Conclusion

The growth in speech-recognition technology applications over the past few years has been impressive, with important ramifications for telephony in general, and the communications-intensive, resource-conscious higher education environment in particular. As the evolution of transparent computing continues its inevitable course, and the human–machine interface becomes even less visible, we may well find telephone interactions of the kind that opened this article becoming the rule on campuses everywhere. With ASR, campus telecom specialists can have at their disposal a cost-effective tool for achieving efficient campus communications.

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Jeanine Hirsch, Vice President of Institutional Development at the College of St. Elizabeth, accepts the award for Institutional Excellence Award in Telecommunications at ACUTA's annual conference.

Institutional Excellence Award

College of St. Elizabeth

by John Haring

In the Beginning...

And the word came from above, and in a traditional, Catholic institution it truly *did* come from "above," that we should be technologically superior to our direct competitors. A directive in the College's strategic plan said, "Expand and integrate technology as a major campus resource to enhance communication and learning, improve services, provide new modes of delivery of educational programs."

To say that the College of Saint Elizabeth in Morristown, New Jersey, was a technological wasteland prior to 1998 would be an insult to wastelands. Sure, there were computers on some desktops and some "networked" computers in labs. But e-mail was a UNIX-controlled, text-based nightmare that only the privileged few with dial-up connections could use. Internet access was a 56K line that was shared by those "networked" computer labs; 386-class computers with Windows 3.1 were commonplace. "Power-users" with 486s or low-end Pentiums were scarce.

For 99 years, the only high-level communication at the College took place in the chapel. In a short period of time, the College of Saint Elizabeth campus has been transformed from a pen, paper, and typewriter environment to its current state of full connectivity between all buildings and desks by way of gigabit backbone and switched 100-megabit Ethernet to every desktop.

A Leap of Faith

While campuswide, fiber-dominated voice, video, and data implementations are commonplace at research facilities and larger institutions, producing a state-of-the-art implementation at a small, 100-year-old, Catholic institution was something that required a "leap of faith" on the part of the financially austere administration.

Since we're a small college, the circle of decision-making was not very broad. The executive director of information systems, vice president of finance and administration, and the president made all of the high-level decisions. A large amount of turnover in the information systems department at the beginning of the project allowed us to bring in people with experience with this type of massive project. Our executive director of information systems has a broad range of experience in large-project management. We hired a director of network operations with experience in introducing high-end technology to a number of college campuses and a director of academic computing from a technology-rich campus.

In 1998, with the help of a New Jersey State Higher Education Facilities Trust Grant, the College began an ambitious initiative to wire the entire campus and lay the groundwork for total connectivity. Our ultimate goal was to give every classroom, office, and residence hall room the potential to communicate with one another and the outside world via computer and to access common data and services.

Let There Be Light

Lucent Technologies was brought in, along with their design partner, LAN1. Our phase 1 goal was to connect every one of our buildings, including the residence halls, to a central control room with fiber. In each building, we would connect every office with enhanced category 5 twisted-pair cable and every classroom with both enhanced cat 5 twisted-pair cable and fiber. The residence halls would have one or more enhanced cat 5 twisted-pair connection "per

pillow." We would build a state-of-the-art control room in Henderson Hall in which to terminate our fiber backbone and to, eventually, house our switches, routers, server farm, and telephone switch. We would also build modern, easily accessible wiring closets in each building.

There were many roadblocks along the way, as there would be with any project involving construction in buildings dating as far back as the early 1900s. Having to drill through thick walls was common and, in some of the older buildings, much of the inside cabling had to be surface-mounted.

In the spring of 1999, Lucent completed the cabling project. But that was only the beginning. What were we to do with all of this state-of-the-art cable spanning the campus? Over the next few months, we spoke with a number of systems integration companies and put together a detailed plan to network the campus.

Many Are Called, Few Are Chosen

We sent our RFP only to tier-one companies, such as Cisco Systems, Lucent, and Nortel, requesting comprehensive solutions that ran on a Microsoft Windows NT 4.0 platform and included both data and video. We chose to do this for two reasons. First, we wanted one point of contact for the project in order to avoid finger pointing when problems developed during implementation. Second, we wanted a large, tier-one company that was likely to remain in the business for the life of our equipment.

In every case, these tier-one vendors chose to partner with other companies to provide comprehensive solutions. In some cases, the choice of partners and the way they interacted revealed more about the "partnership" than the solutions they proposed.

The proposals fell into two basic camps: ATM and Gigabit Ethernet. Oddly, some vendors proposed both! We concluded that Gigabit Ethernet could provide the necessary backbone bandwidth at significantly lower cost than ATM.

Ultimately, we chose Lucent Technologies and their partner, TBS Network Intelligence.

Promotion of Technology and Maturity of Effort

Since the rollout of the network in the fall of 1999, many improvements have been made. Servers were added to the original three to handle such things as financial aid (PowerFAIDS), development (Raiser's Edge), print services, lab ghosting, and more.

Our most ambitious effort since the network rollout came in June 2000 when we introduced the Blackboard Course Info system. Blackboard is a comprehensive, online system of utilities for instructors to better manage and communicate with their classes. It allows professors to easily upload course information, assignments, etc., and to communicate with students by means of listserves and chat rooms. Of course, it is Internet accessible. Blackboard has served well to forward our distance-learning goals. We have held formal training for more than 90 faculty members since the rollout of the system.

Blackboard has also proven to be useful as a campus Intranet. Sending an e-mail to faculty and staff groups, all faculty, or all people in a particular building is easier with our Intranet. Employees may also access forms and documents from human resources, media services, and other departments.

In the winter of 1999–2000, we brought full network connectivity to every dorm room and instituted IS open houses in each dorm to help students connect to the network.

We were also eligible this summer for a large grant from the State of New Jersey to purchase academic-

related technology, including a campuswide streaming video solution, giving us access to live, broadcast, and on-demand video from every desktop on campus. It will also allow us to put full-motion video links into Blackboard course materials for access over the Internet. Twenty-one computer labs and classrooms will receive ceiling-mounted LCD projectors. We will increase our existing laptop loaner program and implement loaner programs for digital still cameras and digital video cameras. There are many other department-specific items, all in the name of improving the technological delivery of education.

Measuring Quality, Performance, and Productivity

Most staff time is spent maintaining and improving. Our measurements consist of whether or not the system stays up, whether all workstations are functioning properly, and whether users are happy.

Our quality measurement is the fact that the network has been down a total of three times for nonmaintenance/upgrade or external (power/telecom) reasons since bringing it online in 1999.

Performance is monitored in a few different ways. Our Blackboard server capacity dictates when we should increase RAM and hard disk drive space. Our Internet service provider, MCI/Worldcom, sends us reports of Internet bandwidth usage every month, telling us how close to saturation we are. And probably our best performance measuring tools are our faculty and staff, who tell us when they think something is wrong.

As far as productivity is concerned, we don't need a measuring device to see how our new infrastructure has improved life on campus. E-mail and Internet access alone have increased productivity in so many ways. No more waiting for campus mail to deliver a message or a document. Students are able to access resources from their dorm rooms and have Web mail access from anywhere in the world. Administratively, we are able to access the formerly hard-wired Alpha 2100 running VMS through TCP/IP connection at any desktop on campus. Departments like financial aid and development have client/server-based solutions. And Blackboard is taking our course delivery process to a whole new level.

Cost, Benefit, and Risk Analysis

Bringing full connectivity to the College of Saint Elizabeth has allowed us to realize many direct and indirect cost savings.

Before we brought in Blackboard, we were paying outside firms to host chat sessions for some of our classes. We realized immediate savings by not having to contract for those services. Paper savings from e-mail and use of our Intranet to distribute memos are enormous.

We are still finding out about many ways that we are realizing indirect savings. Our Ghost server, which uses Symantec Ghost 6.0 Enterprise software, can reconfigure an entire lab at once. Previously, one or more of the academic computing staff would have had to do them each individually between semesters. Clean Slate software, which works with our workstation security software to prevent students from changing configurations or installing unauthorized software in the labs, is saving us many hours of problem analysis and reconfiguration time.

From an organizational standpoint, this project is not only evolutionary, but revolutionary. Although the initial implementation and configuration is complete, the effects, both technologically and sociologically, on our organization will be long lasting. E-mail, Internet, intranet, and streaming video were all foreign terms to many people on campus just a few years ago. Now they're not only in their vocabulary, but a way of life.

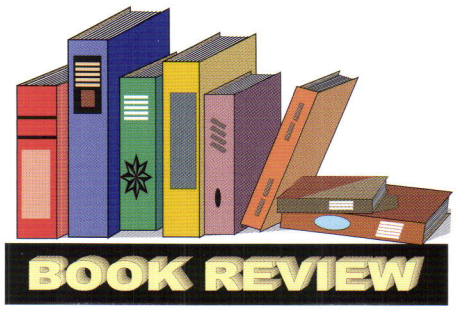
Catastrophic Success

During an address in the fall of 1999, the faculty were told that by the spring they would all have state-of-the-art e-mail and high-speed Internet access at their desks. From the rousing applause on that day to the excitement across campus for the upgrades that we are planning for the summer, all indicators point to a plan that has succeeded.

We are now in a period of "catastrophic success." Catastrophic success is defined as "recognizing the need and benefit of new and improved technology, but unable to fund, implement, and train fast enough to satisfy the institution's needs." We must temper our future vision with knowledge of available resources.

In closing, to accomplish the feats that brought technology to the College of Saint Elizabeth campus in such a short period of time and to produce the quality, performance, and productivity results that we have was truly a miracle. It's a shame that we didn't have another 20 pages to describe it. There's so much here that we're proud of!

John Haring is executive director, Information Systems, at the College of Saint Elizabeth. Reach him at jharing@liza.st-elizabeth.edu.



Internetworking Multimedia

Authors: Jon Crowcroft, Mark Handley, Ian Wakeman
Morgan Kaufmann Publishers, San Francisco, CA: 1999
290 pages

Reviewed by Bill Brichta, DeSales University

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Internetworking Multimedia is a useful primer on which technology elements are required to support state-of-the-art multimedia on campus networks. It has easy-to-follow, direct explanations regarding how these building blocks work together to generate the end result at your PC. Most importantly, the authors illustrate all the principles with concrete examples, which facilitates both understanding and recall.

The text begins with a short introduction to the topic of each chapter followed by plenty of examples to explain the concepts. I particularly liked the "roadmap" illustrations throughout which clarified where we were going and why it was important to understand this concept first. Some sections can be characterized as very technical, particularly those which describe audio signals. Several engineering aspects to signaling are covered as background for explaining new technology at the cutting edge. A few calculus equations are included as well.

Overall, this is an interesting book that will make you think beyond just the basic e-mail capability of your desktop machine, and start to consider how much more you can derive from the hardware we startup each morning. While all of the whiz-bang concepts covered in the chapters may or may not be here next year, the real value is an understanding of what is possible using multimedia in its current form and capabilities. Remember, the 1930 Chicago World's Fair once predicted that we would all be driving on elevated highways of glass by the 1970s, so you need to take some of this and any author's predictions with a grain of salt.

I would recommend this book to anyone investigating possibilities for multimedia over their current campus communication pathways, or anyone looking for a real understanding of the technical prerequisites for advancing multimedia applications at their institution. In the second case, the text can function as a good source for translating and decoding any new terms that we would encounter working with multimedia. This would be similar to the way most of us came to understand how LANs, MPEG, routing, etc., work as part of the necessary interaction with telecommunication systems.

Bill Brichta is chief technology officer, DeSales University OSFS, PA and can be reached at brichta@desales.edu.

Executive Director's Report

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successful annual conference, our second largest ever in attendance. The combined efforts of the program committee, board, and staff created a conference of high-quality educational offerings that sets a new standard for ACUTA educational events. We look forward to meeting or exceeding this standard in 2002 at Reno/Lake Tahoe.

In the publications arena, the *Journal* continues to be well received, with articles of consistently high quality and practicality for ACUTA members. As the *Journal* focuses on high-priority issues such as cybersecurity, new technologies, alternative revenue sources, and the impact of the Web on instruction, our research shows that it has become a valuable resource that is now being sought out by authors and advertisers. Later this year, we will be placing the full text of *Journal* articles online through the ACUTA Web site in order to enhance its usefulness to you as a resource.

In the corporate relations and marketing area, we have several important accomplishments to report. We implemented the focus group program, which provides coordination and support to our corporate affiliate members who wish to hold focus groups for market research in the higher education community. This activity is designed to encourage the development of products and services that meet the needs of the college market.

The Integration Station was a new feature in this year's conference exhibit hall. This was a pavilion within the conference exhibit area designed to showcase emerging technologies. Our focus was on VoIP products, and several companies participated with products from a variety of vendors running on a network demonstrating VoIP applications.

The staff also created a new section of the ACUTA Web site for corporate participation. Companies that are interested in membership, exhibiting, sponsoring, or other ACUTA involvement can now access the tools they need to facilitate their involvement on our Web site. This new site attracted interest from several new companies and increased the speed and efficiency of interactions with existing participants.

In the legislative and regulatory arena, we represented ACUTA's interests before the FCC and with other industry organizations. We filed comments with the FCC on many important issues, including preserving our ability to reserve telephone numbers, universal service fee reform, commission arrangements for toll-free services, preserving the ability of campuses to enter into exclusive contracts with telecommunications service providers, saving Instructional Television Fixed Service spectrum from reallocation to 3G wireless services, preventing unauthorized charges, and others. We collaborated with five other higher education associations to file comments in the FCC's Competitive Networks proceeding, seeking to retain a measure of control over which vendors will be allowed to physically enter campus housing and market services to our students.

We also published 12 issues of the Web-based newsletter, the *ACUTA Legislative/Regulatory Update*. This newsletter contains timely information on federal regulatory and legislative developments that may directly affect your campus. Its goal is to help you to become better informed and able to advise your campus on important regulatory issues that will affect your way of doing business and your bottom line.

As in any busy and successful operation, the accomplishments really belong to a team rather than one individual. Each member of the ACUTA staff team has contributed to many of the projects listed above. So, I would like to extend my deepest personal thanks to each and every member of the ACUTA professional staff for their hard work, creativity, and dedication throughout the past year.

- Kevin Adkins, manager of corporate relations and marketing
- Kellie Bowman, membership development manager
- Amy Burton, administrative assistant/ marketing coordinator
- Lisa Cheshire, meetings manager
- Lori Dodson, accounting assistant
- Aaron Fuehrer, computer services manager
- Donna Hall, manager of professional development
- Pat Scott, communications manager
- Eleanor Smith, business manager
- Megan Statom, communications/Web assistant

The ACUTA professional staff team is committed to helping our members succeed in a dynamic higher education and technology environment. We are looking forward to working with our leadership team on the board of directors and committees to revamp ACUTA's strategic plan and develop new programs and services for ACUTA members. I would be happy to answer any questions about this report or other ACUTA staff activities. Feel free to contact me at (859)278-3338, ext. 25, or e-mail jsemer@acuta.org.

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From the Executive Director

Executive Director's Report to the Annual Business Meeting

Jeri A. Semer, CAE

Each year I use the fall issue of the journal as an opportunity to share the substance of my annual report to the membership with those who could not attend the business meeting held at the annual conference. This report is an opportunity to reflect on the activities of the ACUTA professional staff during the prior year and to highlight some of the accomplishments that have benefited ACUTA members.

Never happy with the status quo, we have continued to add to the services we offer to ACUTA's institutional and corporate affiliate members. In many instances, ACUTA's committees, composed of volunteer members of the organization, have participated in a major way in developing and implementing these services, and we are always grateful for their expertise, advice, and dedication.

Here are some highlights of our ongoing efforts and some new developments that were recently introduced.

I am happy to report that the ACUTA membership has grown during the past year. As of June 30, we had grown to a total of 839 institutions. Just as importantly, we retained over 90 percent of ACUTA institutional and corporate members from the prior year—evidence of continuing satisfaction with the return on dues investment.

We have continued to strengthen our liaison with other professional associations in higher education and telecommunications. ACUTA's officers and staff participated in two meetings of the Council of Higher Education Management Associations, and we participated in the conferences of other higher education associations for the purpose of promoting membership and participation in ACUTA. We have worked hard to increase ACUTA's visibility as the best resource for information on telecommunications technology in higher education. Several new institutional memberships and corporate participants are a direct result of these efforts.

This year we have also made some major changes in ACUTA's Web site. I hope that you will take the opportunity to experience the capabilities of the new Web site soon.

The new design represents a complete overhaul of the basic architecture of the ACUTA Web site as we begin to migrate to a portal environment that will allow members to customize the information to meet their needs. Enhancements that have been introduced so far include greatly enhanced search capabilities, allowing members to search multiple types of ACUTA documents and files on the topic of their choice. The basic architecture is now in place to accommodate a wide variety of new information and services that will be introduced over the next few months.

ACUTA's home page on the Web was introduced July 1, 1995. Since that time, the site has had over 129,000 separate visits. That's an increase of more than 39,000 visits since this time last year—a 45 percent increase over the entire first five years' total combined!

In the educational arena, since last year's conference we have introduced a totally new type of ACUTA educational program—the Web/audio seminar. We have conducted two of these programs so far, combining the interactivity of the Web for slides and e-mail dialog with the instructors with the reliability and ease of access to audio over phone lines. These seminars have been well-rated by participants, and approximately 700 ACUTA members have participated to date in these two Web seminars alone. We also continued the popular audio conference series on timely legislative/regulatory topics.

We are excited to report that we're currently in production on ACUTA's first CD ROM-based course, "Introduction to Data Networking for Voice Managers." (See page 36.) This CD will be available by the end of September. We will be making it available at a very reasonable cost and hope that it will meet some of your staff's needs for education on this topic.

And finally, in the education area, I cannot fail to mention the

continued on page 46

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